

**GetFreshFood**

## **User Requirement Specification**

**2020**

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## **2 Abbreviations**

API = Application Programming Interface

PO= Purchase Order

UI = User Interface

## **3 Introduction**

### **3.1 Purpose**

This report analyzes the challenges and frustrations faced by GetFreshFood supermarket, the technological integration with automation strategies designed to address these issues, the design, functions and purpose of the User-Interfaces for customers and staff to use and future system implements. This report will provide the user requirements specification of the system of what is required in the new system, how the design is cost-effective to GetFreshFood's current situation and how the system architecture will be implemented.

### **3.2 Background Information of the system to build**

GetFreshFood is a traditional brick-and-mortar supermarket store based in Singapore that is looking to incorporate digital solutions to automate most of its business operations and eliminate discrepancies in its sales and inventory records. The system will mainly introduce a new online store platform to take in online orders with delivery services for customers, improve the current physical store technological system and provide automated report generation for the store management to easily do data analytics and visualization. The digital transformation is meant to keep up with competitors and increase sales.

#### **3.2.1 Challenges and Frustrations of GetFreshFood's Operations**

An analysis of the feedback obtained from the employees highlighted a few areas whereby manual work processes can be replaced with digital solutions to be completed in a more efficient manner. The main challenges and frustrations of customers and staffs are as follows:

- 1) Time-consuming to manually count stock, order goods and label price tags, with the high potential to label/update product prices wrongly especially if there is miscommunication among staff.

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- 2) Discrepancies in sales and inventory records resulting from cashier manually keying in wrong product code and price or promoter forgetting and manually updating price tags wrongly. This leads to extra workload for the manager to write loss-of-sales report to address these discrepancies.
  - 3) Tallying the end-of-day sales records and other reports manually is both time-consuming and subject to human error for the manager especially when the eyes are tired or when documents (e.g. receipts) go missing.
  - 4) Tedious and lengthy for the manager to manually gather data to review the weekly sales result of all product and sort them into their classifications.
  - 5) Long queues for customers especially during peak hours because of a manual cashier system
  - 6) Lengthy refund/exchange process for customers when they complain about the quality of the goods (damaged/expired)

## 4 Overview of In System Scope and Out of System Scope

### 4.1 In Scope of System (Current Implementation)

What is within the system scope will be the features and functions of the new system.

They have been analyzed to be crucial to improving the store's operations and remove human mistakes causing losses to the store.

- Point of sale system
  - Barcode scanner retrieves the product name and price, thereby removing errors resulting from manual price entry
  - POS system automatically tabulates every transaction and updates the database, thereby removing the need to manually generate end-of-day sales report
  - Automatic coin and notes system automatically count the money for transactions made by cash, thus eliminating errors resulting from manually counting the money
  - Nets and Credit Card PayWave System  
The devices offer another alternative to fast and secure payment with rebates and credit card points rewards. Nets card payment involves pressing your pin while credit card

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payment has PayWave system where customers can just tap their credit card on the device and the transaction will be processed.

- Shelf management
  - Electronic Shelf Labels are updated by the database through real-time, eliminating the need to manually label the shelf and products with their price tags
- Inventory management
  - Notify storeman when the product stock is low, eliminating the need for him to manually count the inventory
  - Endorsement of the P.O. order can be done online through the inventory management system by the branch manager, eliminating the need for the branch manager to be at the store to physically sign off the P.O. order
  - Able to automate and track the return process of goods with regards to online shopping
- Ecommerce platform
  - Online platform in the form of a shopping website or mobile app along with a delivery option to eliminate the need for customers to physically make their down to the store to make their purchases and spend time queueing up especially during peak-hours
- Product Locator
  - Online app that can show the shelf and row of a product, to eliminate time taken by customer to locate product
- Delivery Option
  - Delivery option is a new service created for the online store purchases. Online customers will have their purchases delivered to them by third party logistics providers or hiring new delivery staff
- Cloud implementation
  - The system will be on the cloud computing server to maximize cost, performance, security and reliability which we will elaborate in the system architecture component
- Data Analytics and Visualization
  - To show real-time updated data visually in the form of charts and table formats for the current store's situation such as stock levels, product profits and pending tasks, we implement data analytics and visualization dashboards with Application Programming

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Interfaces(APIs) to automatically capture and generate various reports for staff to review and improve decision making

- Domain Email
  - Customers expect an online store to look professional with a domain name and website. A domain email such as contact@getfreshfood.com shows professionalism about the store's business. Free email services like Gmail works great for personal use but do not reflect credibility and trust for business purposes

## 4.2 Out of System Scope (Future Implementations)

These implementations are currently out of the system scope as they are unnecessary and expensive to implement for now. We may however recommend implementing these tools in the future when the situation calls for it.

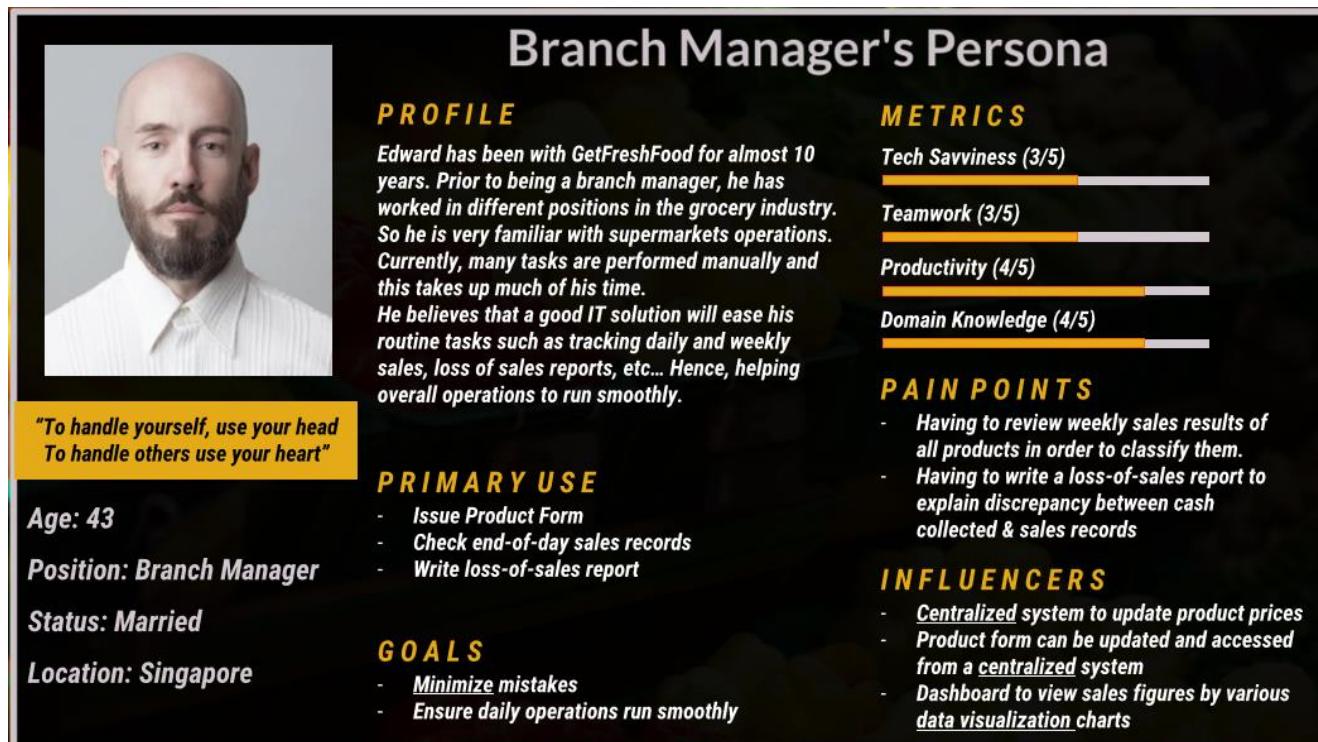
- Electronic Surveillance System
  - Right now, based on our analysis of the discrepancy situation, we deem it to be coming from the miscalculation of stocks and prices. Therefore, we aim to eliminate these issues with our proposed system scope. However, should the discrepancy problems persist, we recommend implementing the EAS (Electronic Article Surveillance) System to detect theft from the store. The alarm fences will ring loudly when someone walks past these fences with unpaid goods. It will alert the staff of any shoplifting activities.
- Self-Checkout Kiosks
  - Self-checkout kiosks are machines that enable customers to process their own purchases from a store. The customer performs the cashier job by scanning the items and then making payment. This shortens queue at the physical store, but we recommend implementing this only when the customer growth has expanded rapidly because we already have the online store platform and the new automated POS system to shorten customer waiting time. In addition, more manpower and budget are needed

to maintain these kiosks therefore the company must consider its budget, profit and customer growth first.

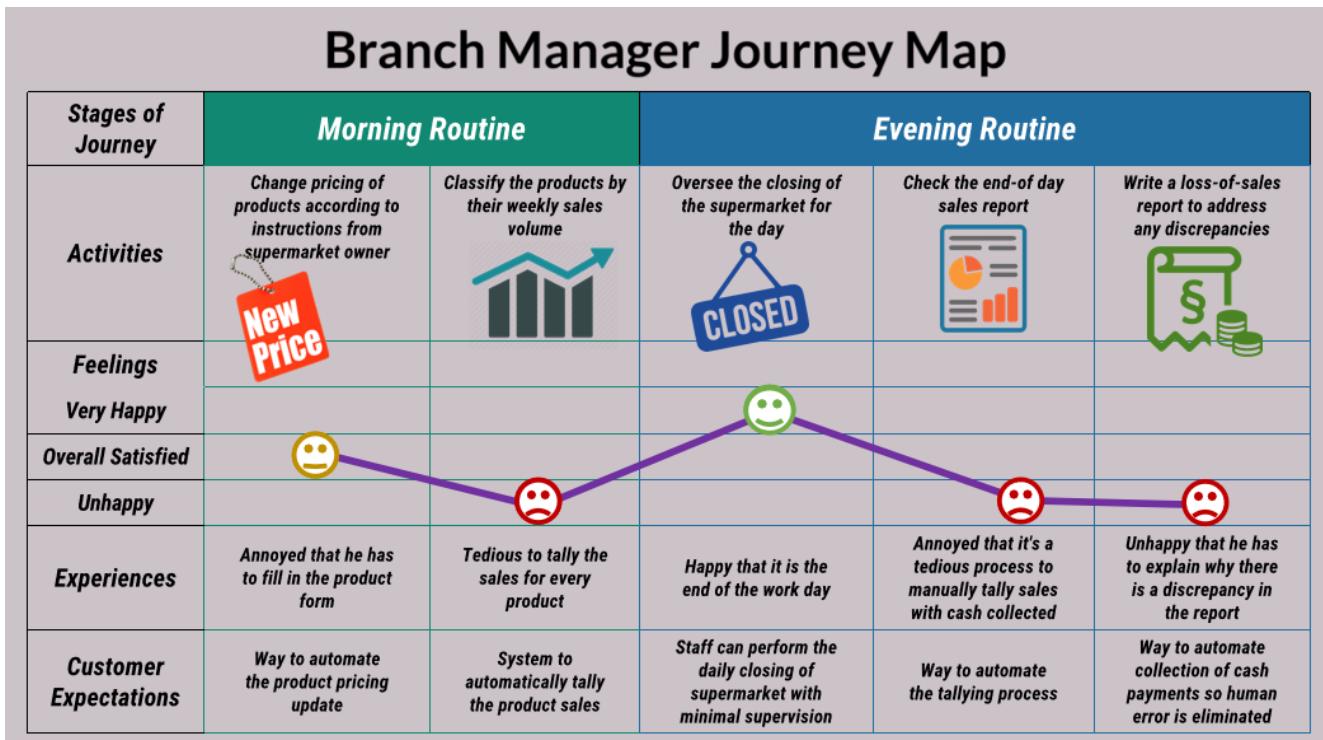
## 5 Two Persona and journey map analysis for the system

This section will elaborate on how the current situation at store affects the staffs and users through the eyes of the branch manager and a customer. A person and journey map for the branch manager and the customer will be used to allow better understanding of the user's needs, experiences, behaviours and goals. A persona is a fictional character created upon research in order to represent the different user types that might use the store's service, product or site in a similar way. The journey map is a visual representation of the steps the user is going through and his or her experiences.

### 5.1 Branch Manager Persona



### 5.1.1 Branch Manager Journey Map



## 5.2 Customer Persona

**CUSTOMER'S PERSONA**



**Profile**

Amanda would normally patronise the store in the evening after work to purchase groceries on behalf of her family. She does not like to spend too much time trying to locate her desired products since she needs to head home and prepare dinner before her children come back from school. She prefers organic food and looks out for healthier options for her family.

**Primary Use**

To purchase fresh foods and household items

**Goals**

- Purchase product at a competitive price
- Find the product easily without spending too much time

**Influencers**

- Value-for-money products
- Wide selection of products
- Short and efficient checkout
- Products that are easily located

**Metrics**

Metric	Value
Tech Savviness (3/5)	<div style="width: 60%;"></div>
Spending Power (3/5)	<div style="width: 60%;"></div>
Quantity of Purchase (2/5)	<div style="width: 40%;"></div>
Frequency of visits (5/5)	<div style="width: 100%;"></div>
Patience Level (2/5)	<div style="width: 40%;"></div>

**Pain Points**

- Long queue during peak hours
- Time-consuming manual checkout process
- Difficulty in carrying large quantities of groceries without any delivery system in place
- Popular items run out of stock in a short period of time
- Inability to locate certain products

" Weight loss and healthy eating is a journey that begin at the supermarket "

- **Age :** 32
- **Work:** Housewife
- **Status :** Married
- **Location :** Singapore

### 5.2.1 Customer Journey Map

Physical Store Walk in Customer Journey Map

Stages of Journey	Motivation	Searches for Groceries			Payment	Evaluate after purchase
		Activities	Feelings	Customer Expectations		
Very Happy	Grocery shopping 	Searches products on notice board 	Locate the rows and choose from a variety of products 	Place the product in the shopping trolley 	Make payment at cashier counter 	Check receipt to make sure total price and quantity is correct 
Overall Satisfied						
Unhappy						
Excited to prepare dinner for family	Need to walk for a while to find certain product	Happy to see many options but confused about which products to choose	Happy to put desired products in shopping trolley but some products are out-of-stock	Unhappy with long queues during peak hours	Satisfied with the cashier's service	Unhappy to discover internal defects like bugs in packet of rice upon opening up of product at home
Free delivery	In-store product navigator	Arrange products that complement each other e.g. bread & jam	Expect to see products fully-replenished on shelves	Online purchase	Clear and detailed receipt	Fast and efficient exchange/refund procedure

### 5.3 Branch Manager User Story

Information from Persona	User Story
<b>Checking the end-of-day sales report</b>	As a branch manager, I would like to view end-of-day sales reports so that I can check if there are sales discrepancies.
<b>View weekly sales result of all products</b>	As a branch manager, I would like to view weekly sales results of all products so that I can classify the products by their sales volume.
<b>Classify products</b>	As a branch manager, I would like to classify products according to how many were sold in a week so that the promoter and storeman can use the information to arrange the products on the shelf and order the appropriate quantity

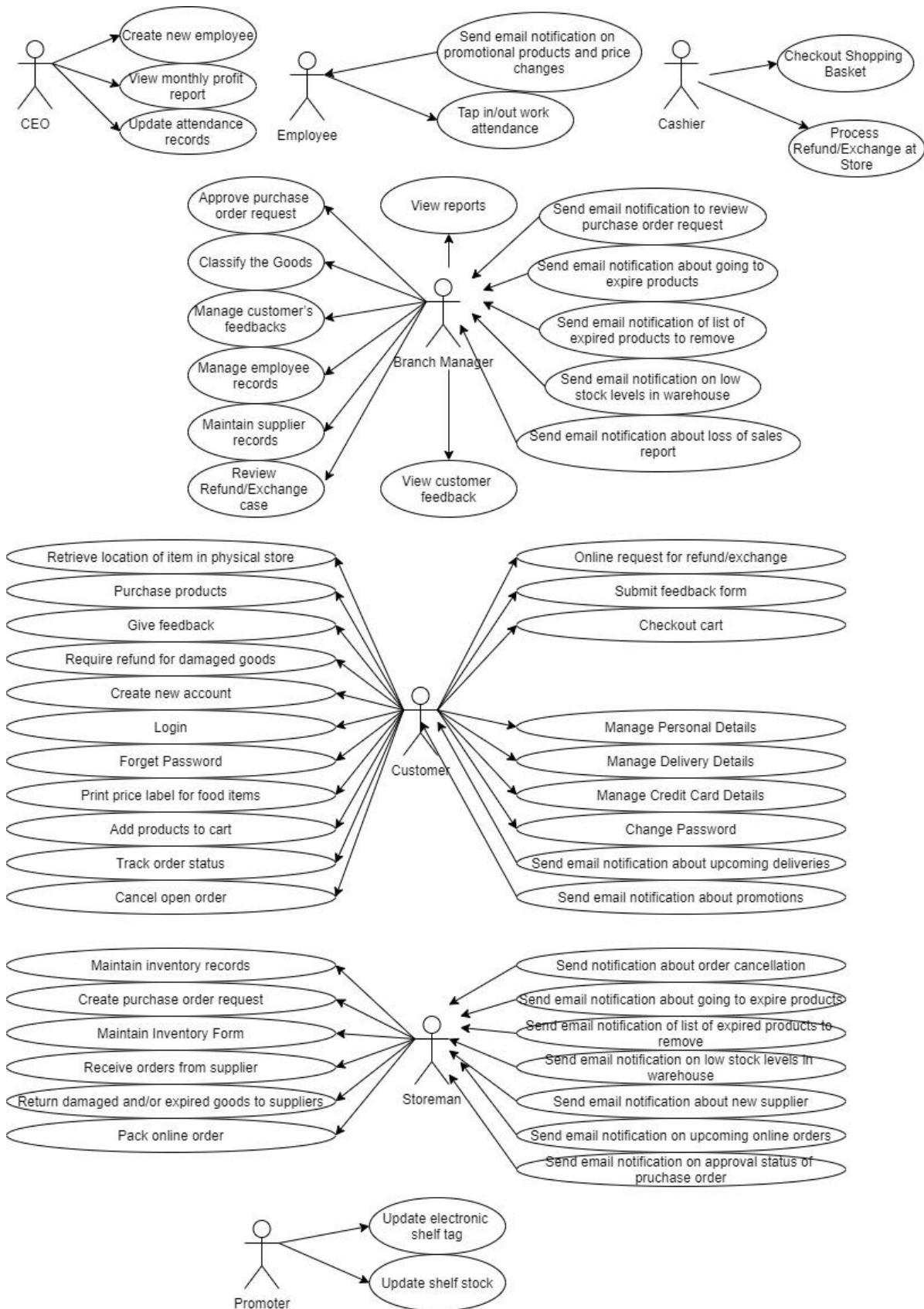
	respectively.
<b>Receives instruction from the supermarket owner regarding change of product pricing</b>	As a branch manager, I would like to be notified when there is a change in product pricing from the owner so that I can change the prices accordingly.
<b>Changing of product prices</b>	As a branch manager, I would like to change the product pricing so that all the records in the supermarket will be updated accordingly.
<b>Submit loss-of-sales report to the owner</b>	As a branch manager, I would like to generate a loss-of-sales report and notify the owner so that the sales discrepancy will be documented.

#### 5.4 Customer User Story

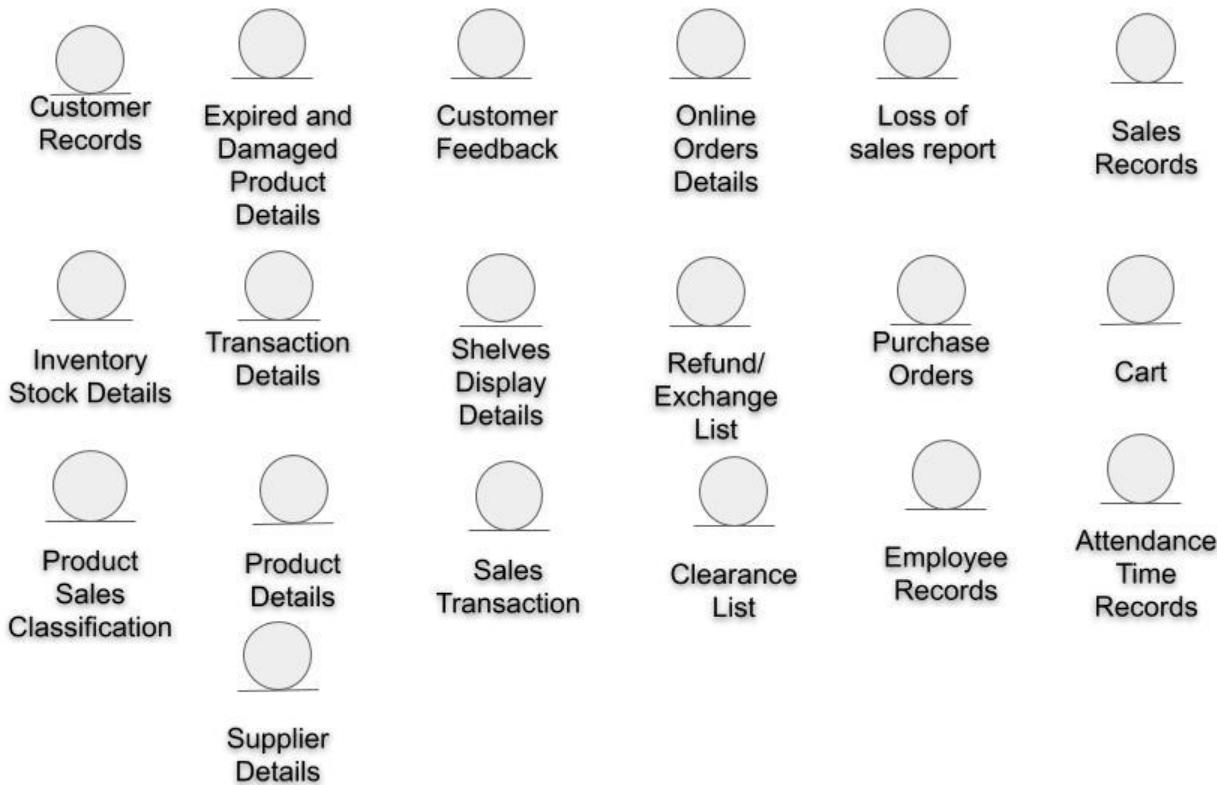
Information from Persona	User Story
<b>Long queue during peak hours</b>	As a customer, I would like to shop on an online shopping platform so that I can shop at my own convenience and eliminate the need for me to wait in long queues during peak hours.
<b>Time consuming manual checkout process</b>	As a customer, I would like to see an automated cashiering system being implemented so that the cashier doesn't have to key in product id and product prices manually and shopping baskets

	can be checked out in a more efficient and accurate manner.
<b>Difficulty in carrying large quantities of groceries without any delivery system in place</b>	As a customer, I would like my groceries to be delivered right to my doorstep so that I won't have to travel back home with heavy groceries.
<b>Popular items run out of stock in a short period of time</b>	As a customer, I would like to see the store implement an inventory management system so that the storemen and promoters can track stocks of popular items and replenish them quickly when they run low, before they completely run out
<b>Inability to locate certain products</b>	As a customer, I would like to see the store implement a system that shows the shelf and row of a certain product so that it will eliminate the time taken for me to search and find that product.

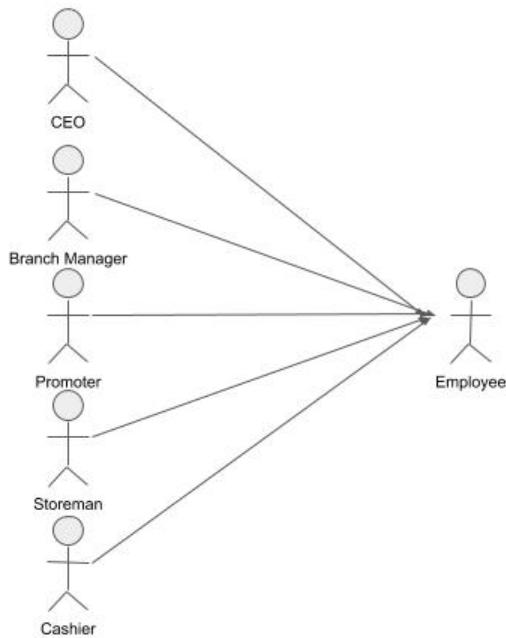
## 6 System use case diagram



## 6.1 Domain Model



## Generalisation of Actors

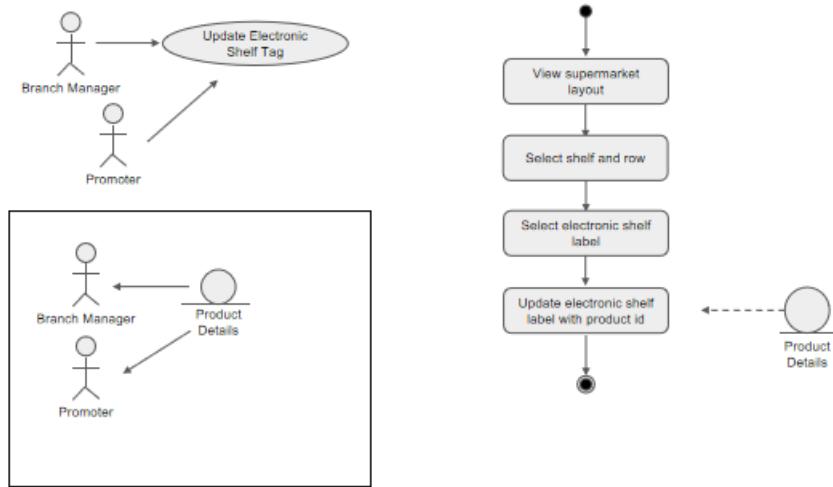


Entity	Description	Attributes / Columns
Customer Records	Record of customer details	CustomerId, CustomerName, Address, HomeNo, Mobile, Fax, Email, Password
Expired and Damaged Product Details	Details of expired and damaged products	Date of Disposal, Product ID, QuantityDisposed, Description
Customer Feedback	Record of customer feedback	Customer Id, FeedbackDate, FeedbackDescription
Loss of Sales Report	Report to address discrepancy between cash collected and total sales	Report Id, Amount Loss, Reason For Loss
Online Orders Details	Record of Customer Orders	TransId, CustomerId, EmployeeId, OrderDate
Sales Records	Displays information about the sales transaction	TransactionId, ProductId, Transaction Date, Unit Price, Quantity, Discount Applied
Inventory Stock Details	Details about product stocks	SupplierId, SupplierName, Phone, Address, ProductId
Transaction Details	Display details about the transaction	Transaction Id, Product Id, Date, Quantity
Product Sales Classification	Classification of products by their sales rate	Product Id, Date, Classification, Rate of Sales

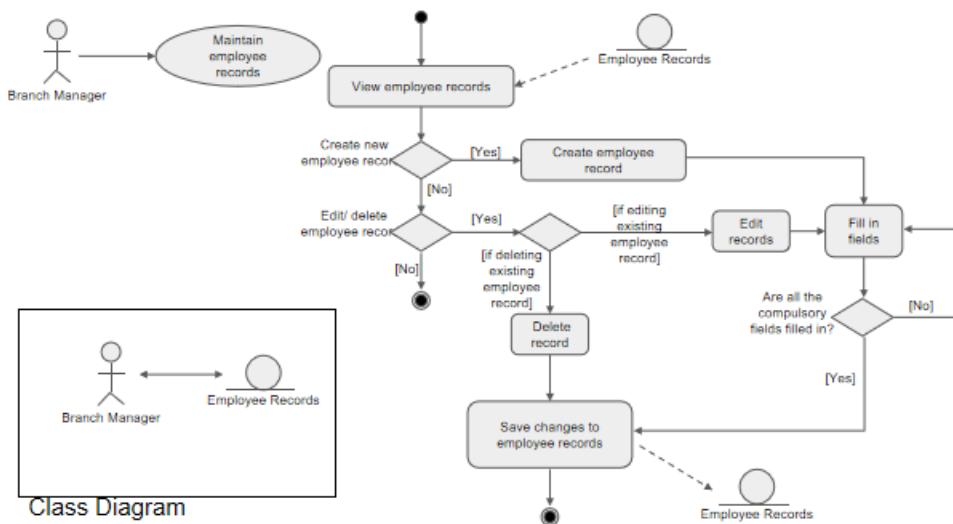
Entity	Description	Attributes / Columns
Shelves Display Details	Record of shelves and Products	Product Id, Shelf No, AisleNo, Date
Refund/Exchange List	Record of the Refund/ Exchange Product List	ProductID, ProductName, Quantity, Description
Purchase Orders	Request to order stocks from suppliers	Date, OrderID, ProductID, Quantity, SupplierID, Status
Cart	Items that have been selected and stored in customer's cart that is yet to be checked out or paid	CustomerID, OrderID, ProductID, ,Quantity, Description, Total Price
Product Details	Record for the Product	ProductID, ProductName, Category, Unit Price, Selling Price, Stock
Sales Transaction	Display information about the sales transaction	TransactionID, Date, QuantitySold, TotalPrice
Clearance List	Records of all the products that will be expiring soon and are discounted at 50% off original price.	ProductID, ProductName, Date, BatchNo, Expiry Date, Quantity, DiscountedPrice
Employee Records	Display information about employee	Employee Id, Employee Name, Role, Salary
Attendance Time Records	Display information about the employee's work status	Employee Id, Time in, Time Out, Leave
Supplier Details	Record of supplier's related information	Supplier Id, Company Name, Product Id, PhoneNumber, Address

## 7 Functional Requirement

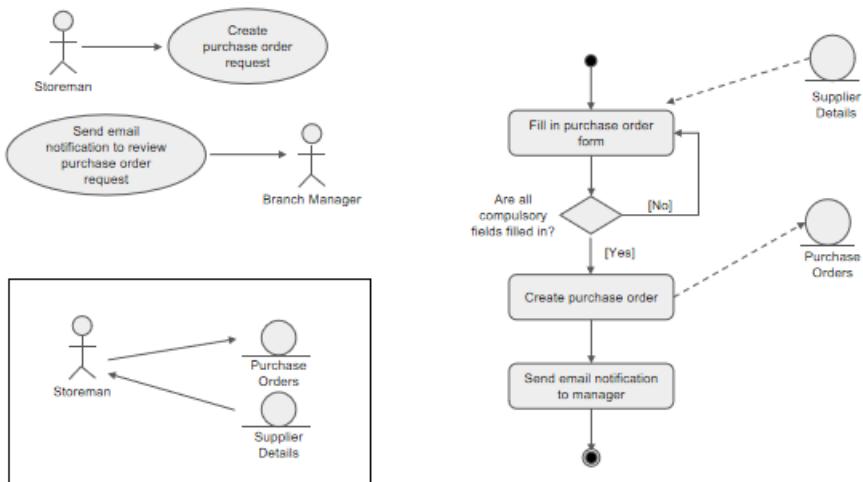
### 7.1 Branch Manager Activity Diagrams



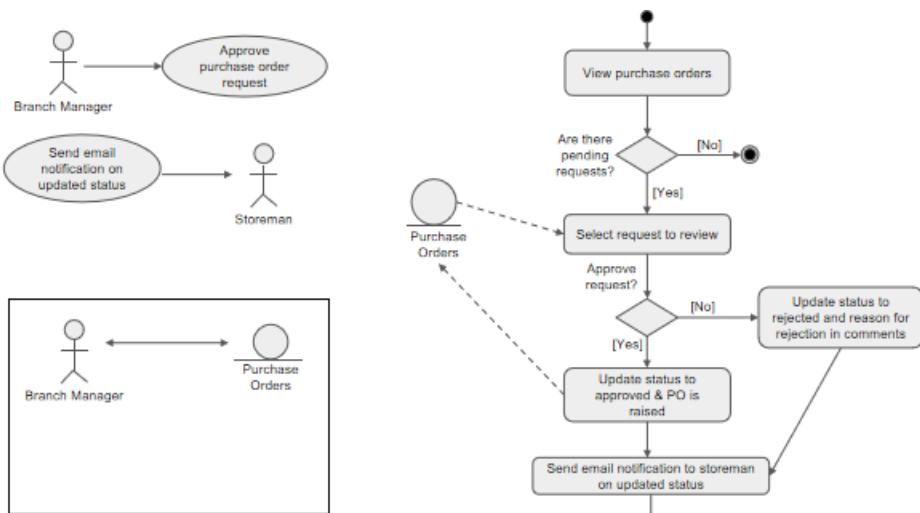
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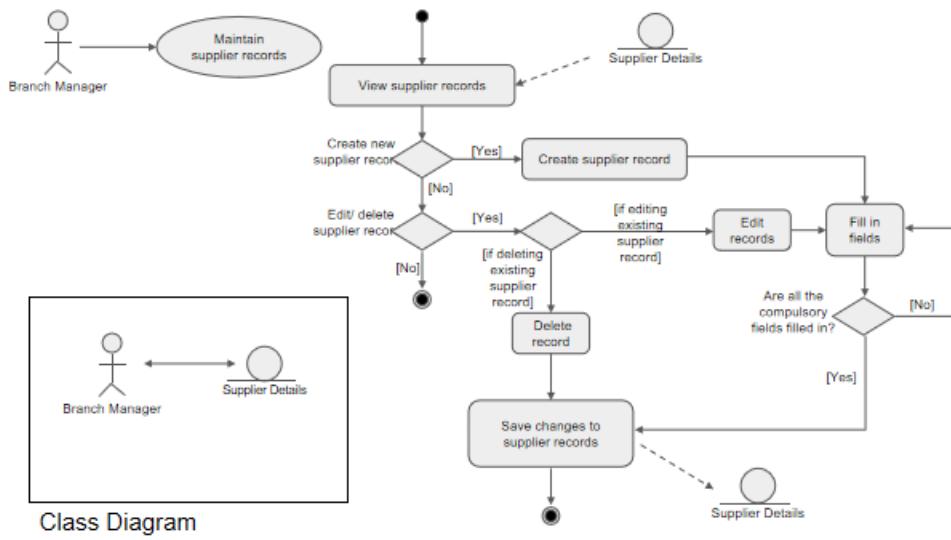
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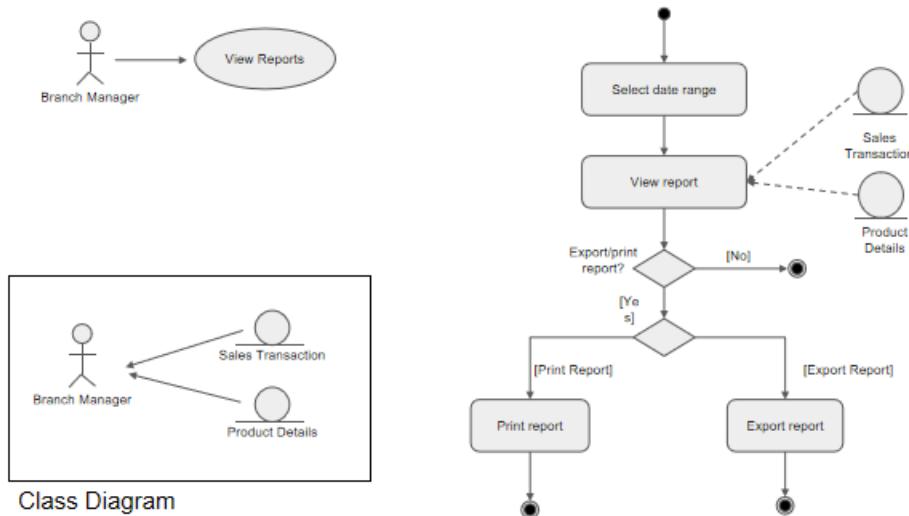
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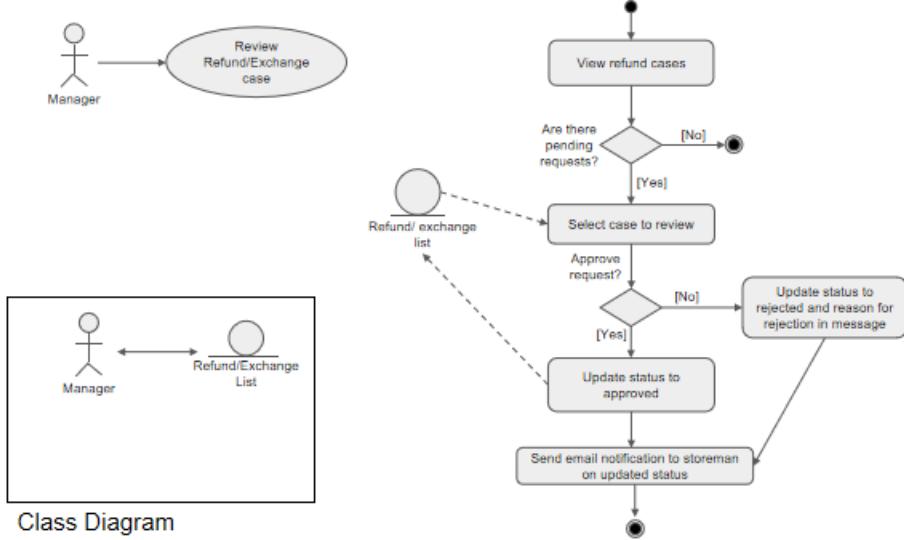
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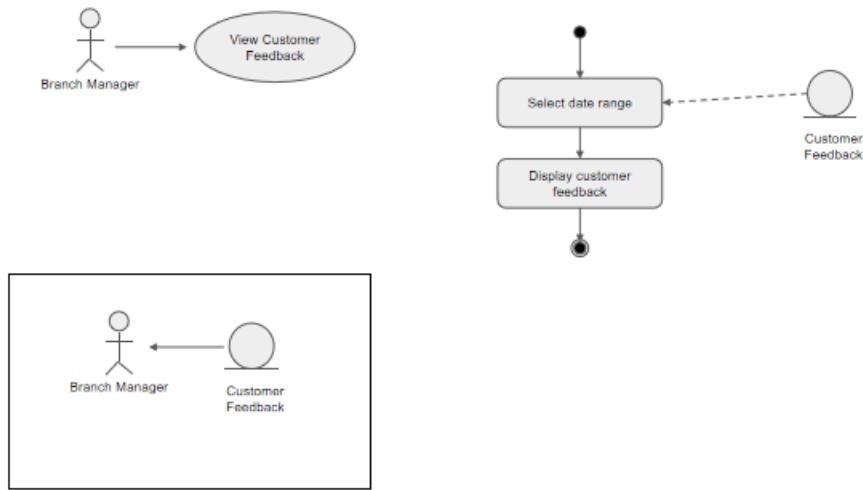
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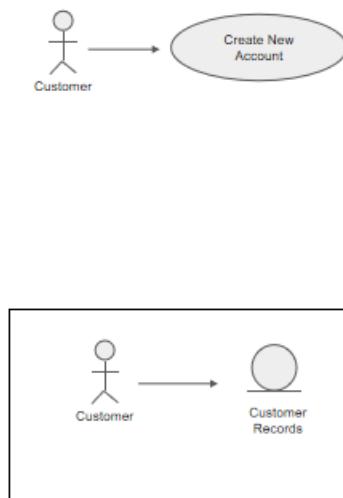


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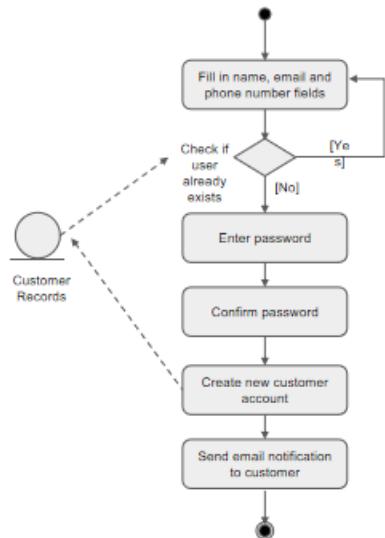


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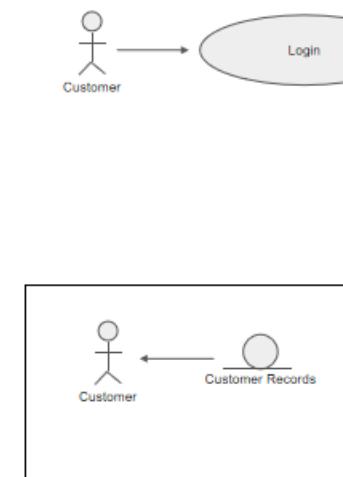
## 7.2 Customer Activity Diagrams



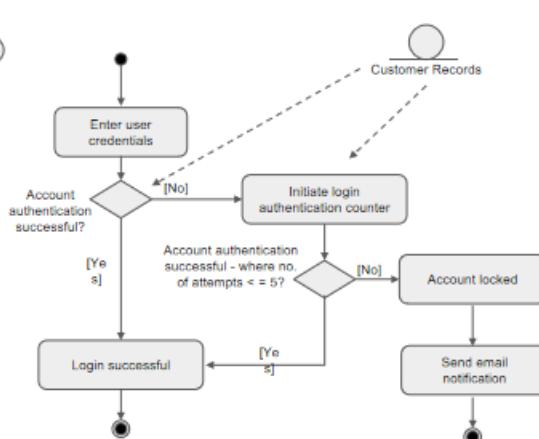
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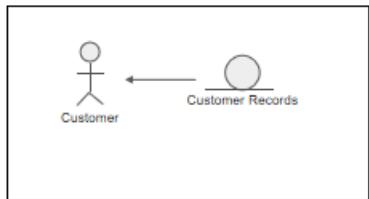


Activity Diagram

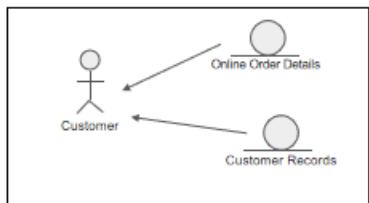
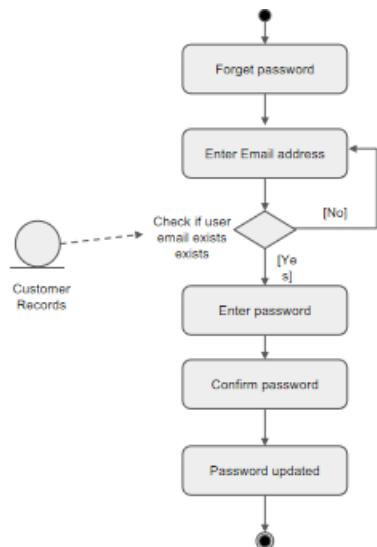


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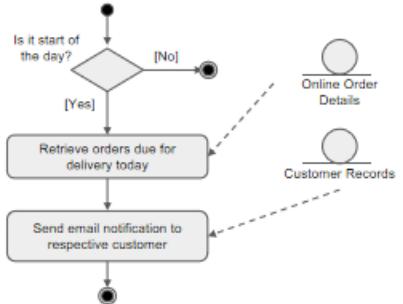


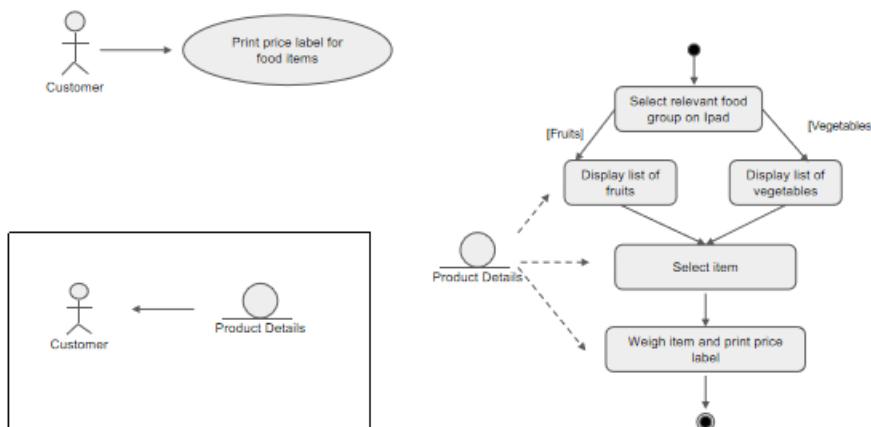


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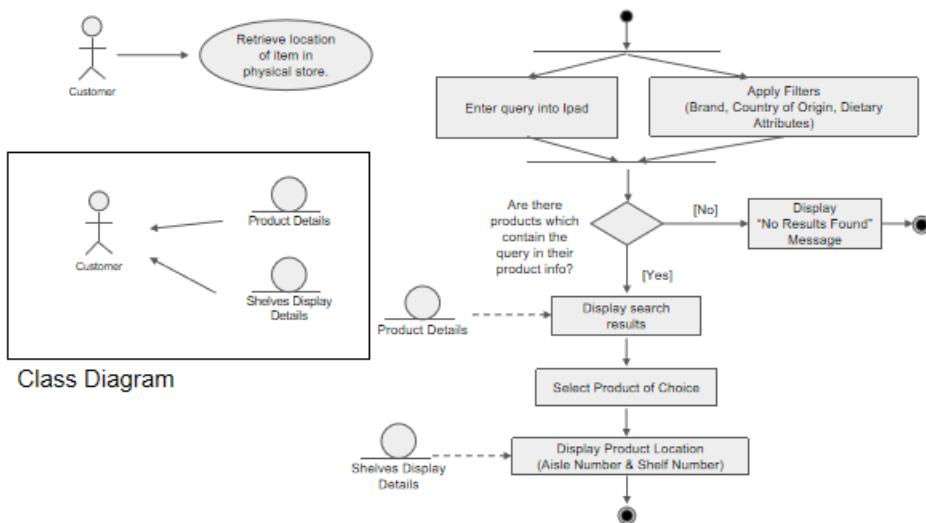


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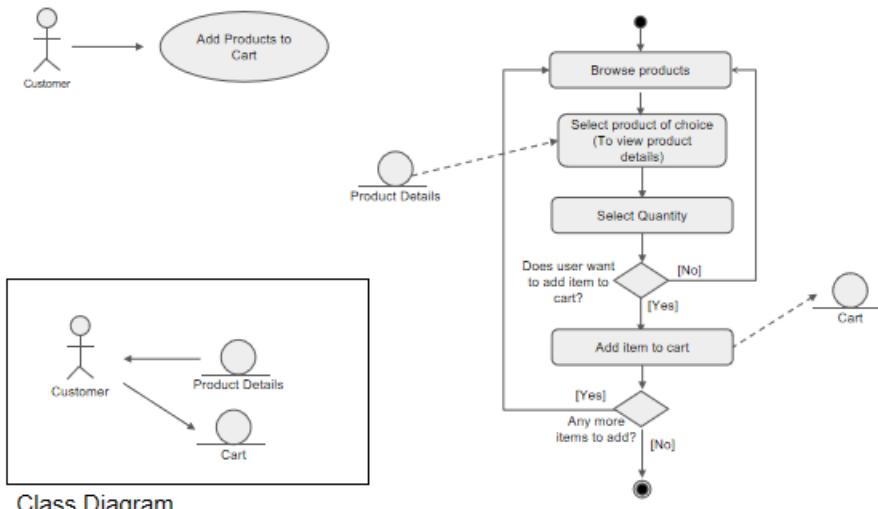




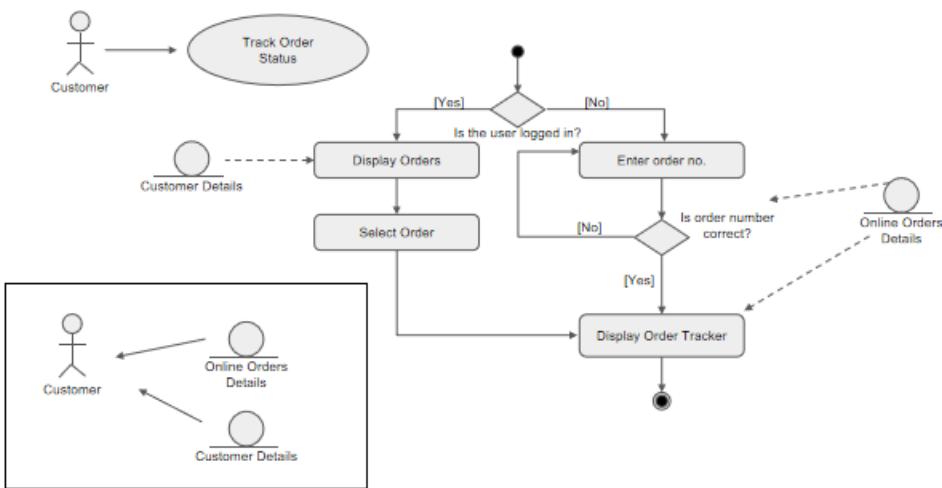
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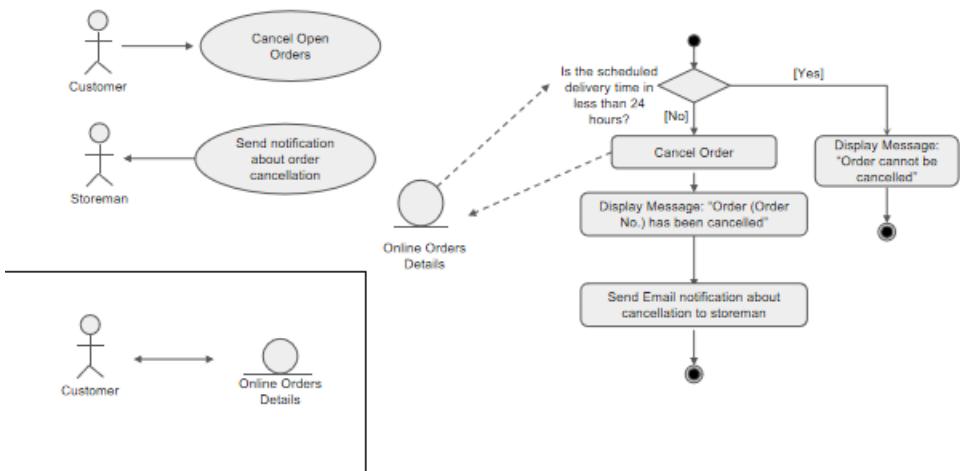
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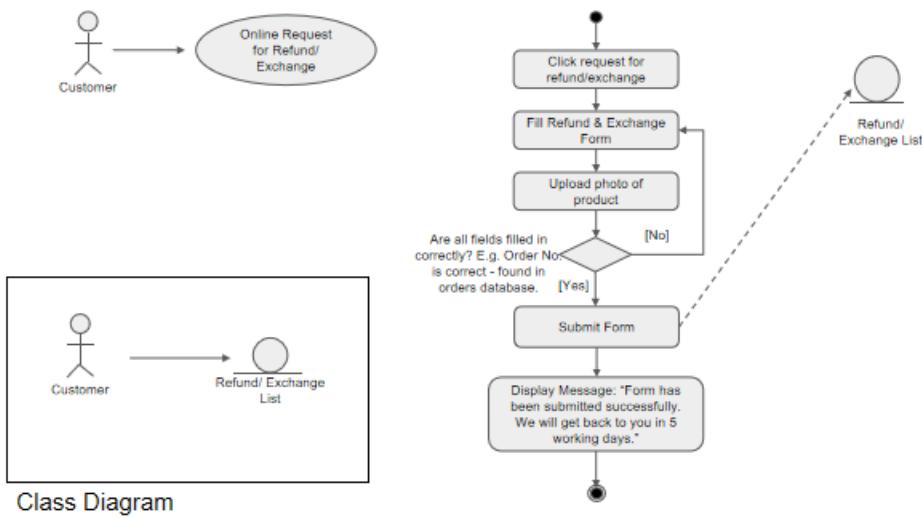
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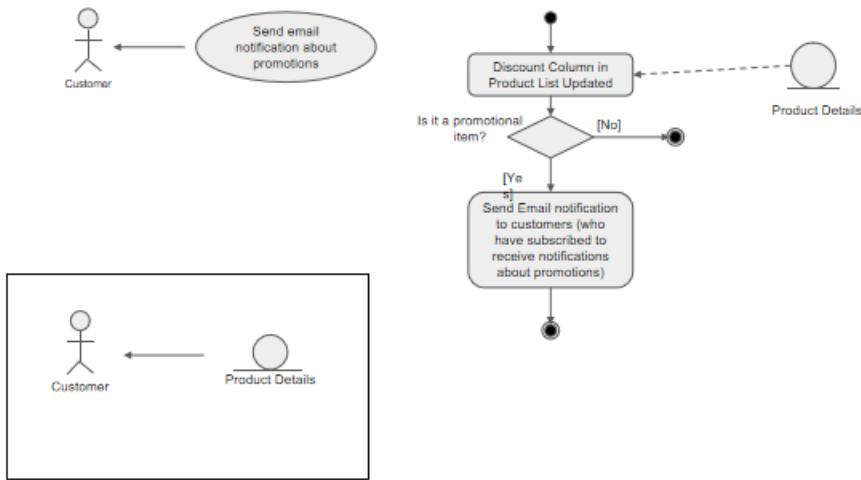
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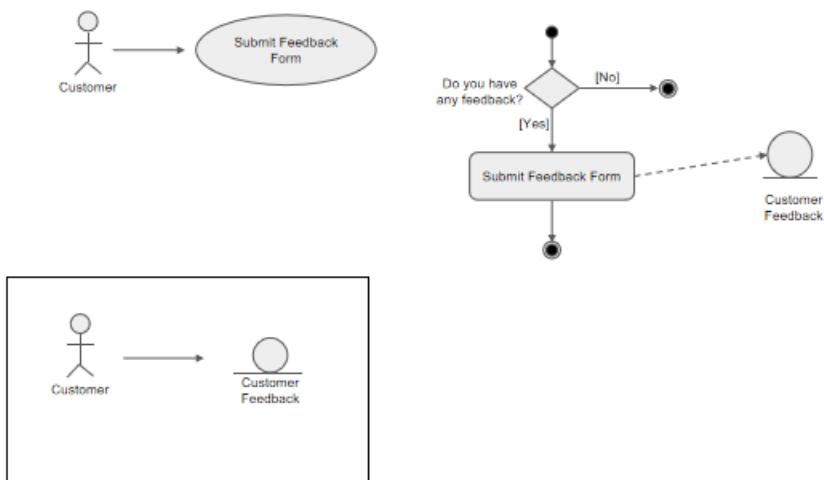
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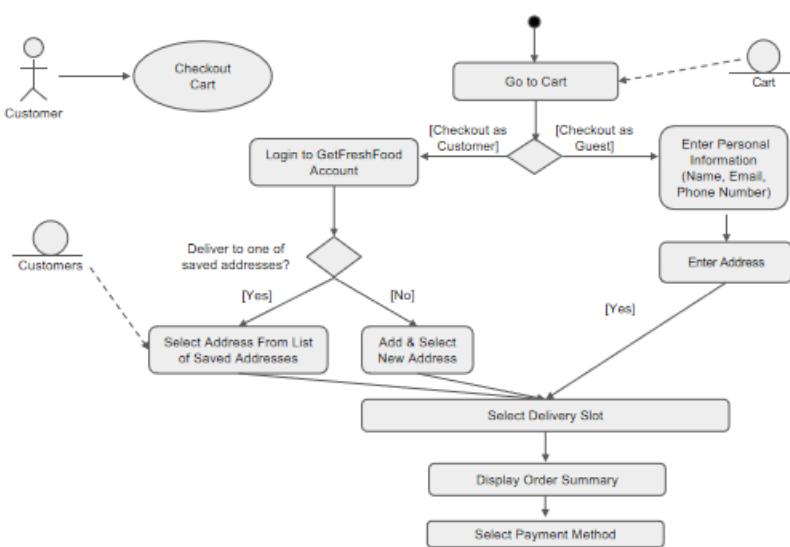
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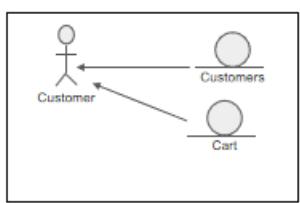


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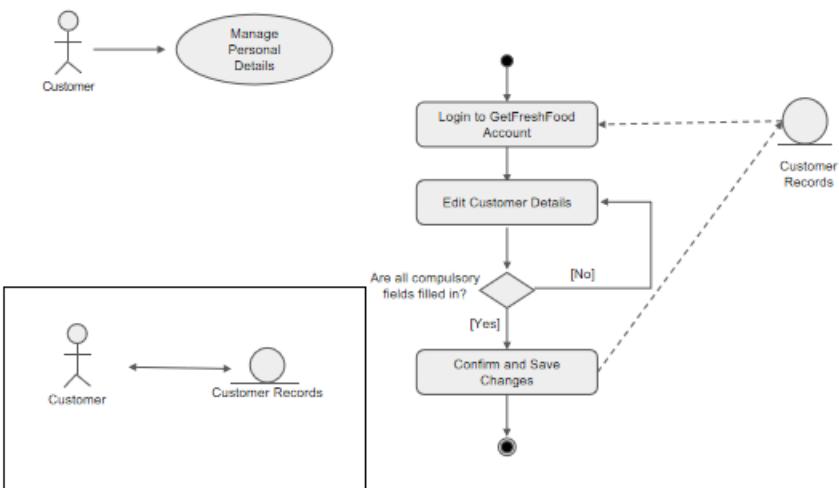
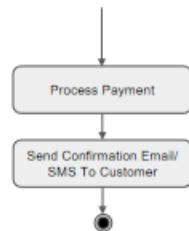


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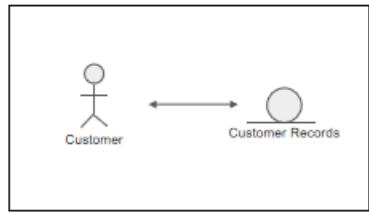
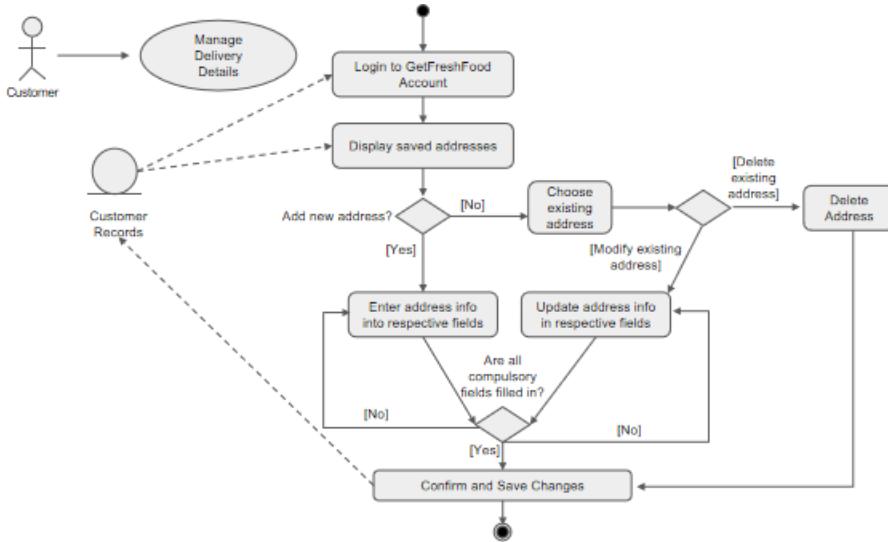




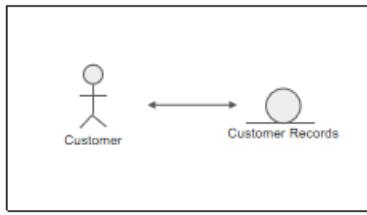
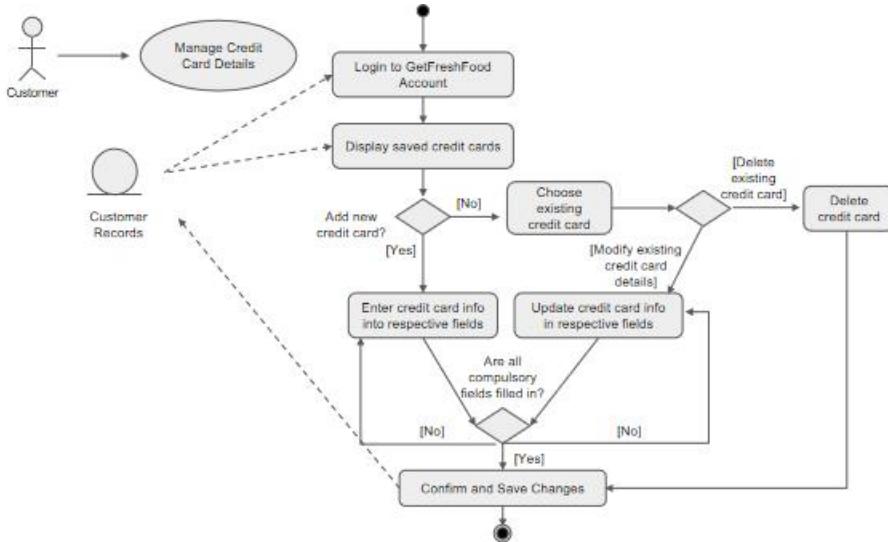
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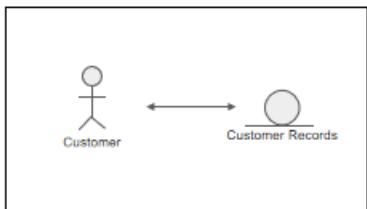
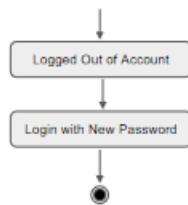
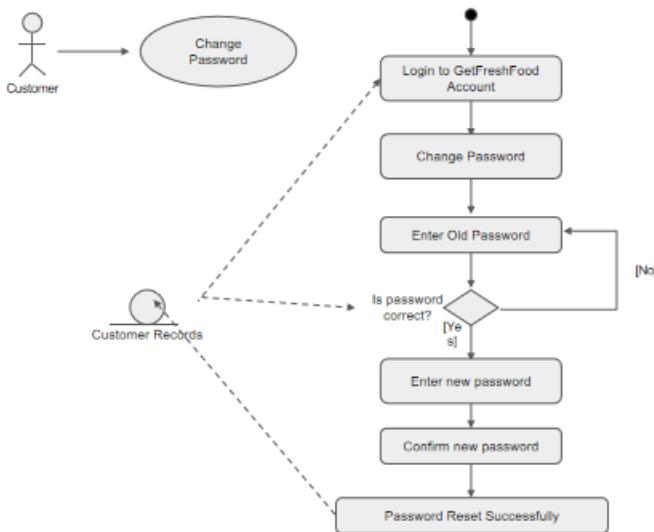
Class Diagram



Class Diagram

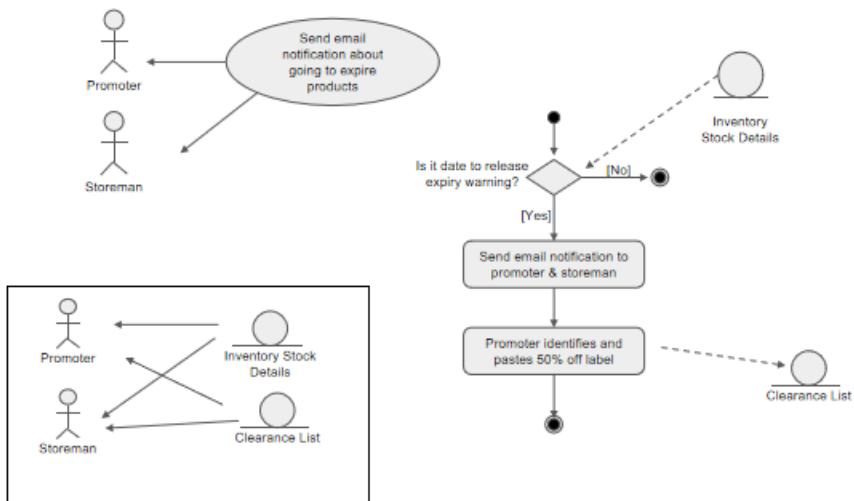


Class Diagram

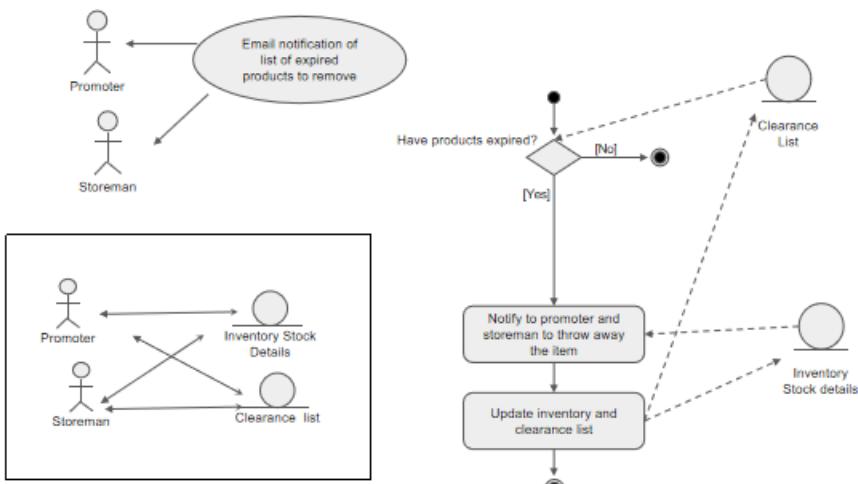


Class Diagram

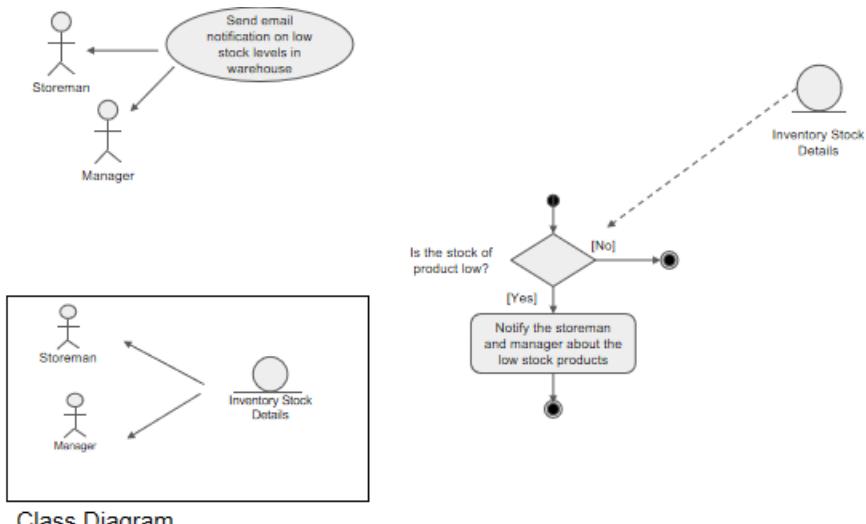
### 7.3 Storeman Activity Diagrams



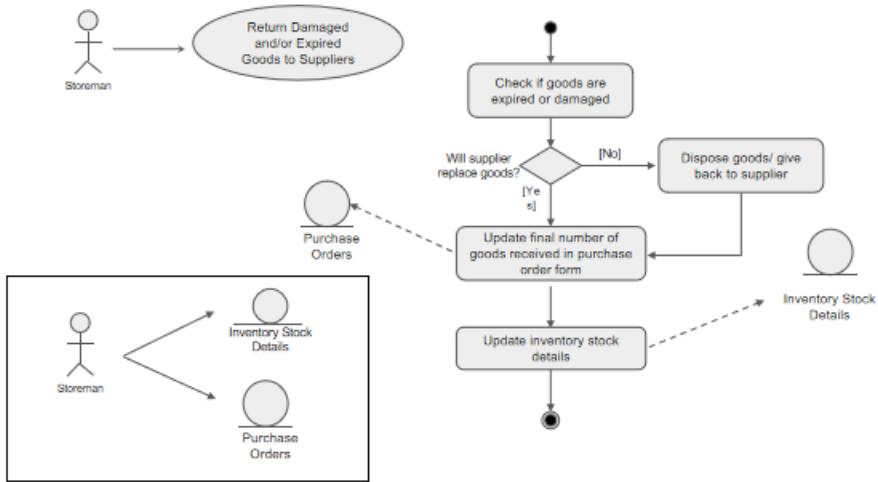
Class Diagram



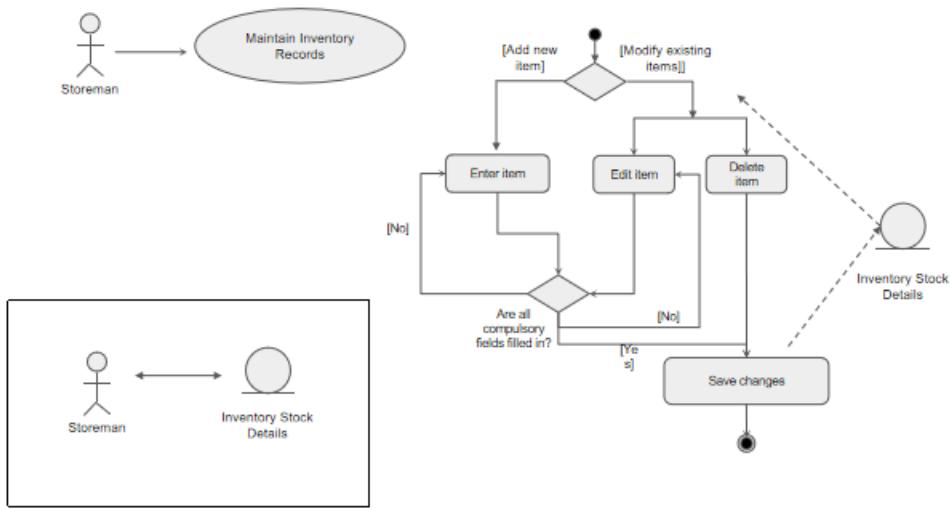
Class Diagram



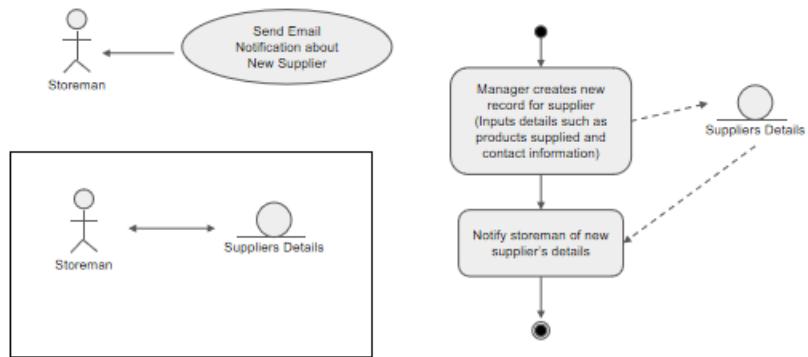
Class Diagram



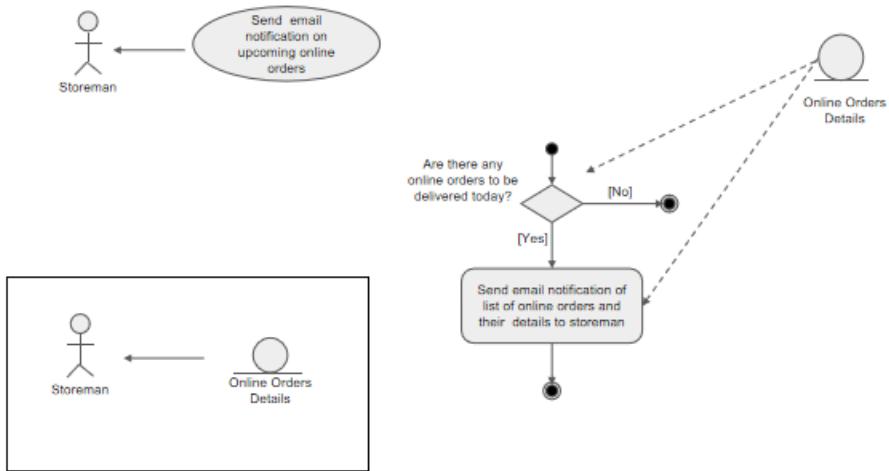
Class Diagram



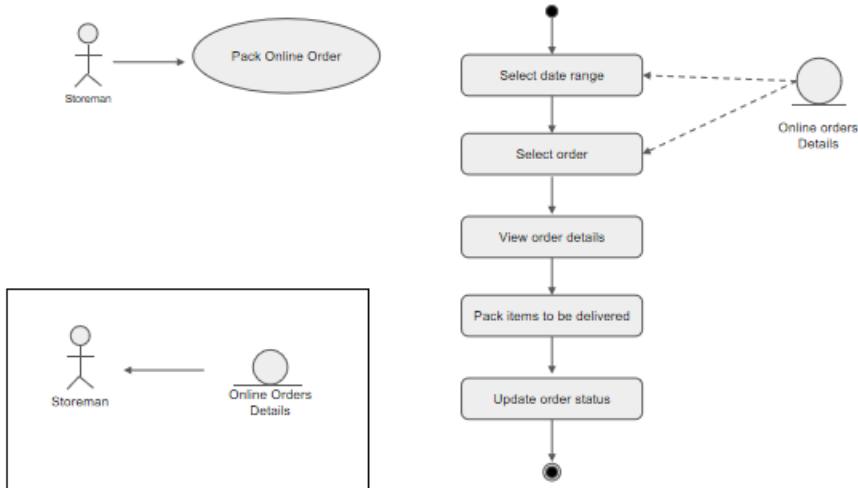
Class Diagram



Class Diagram

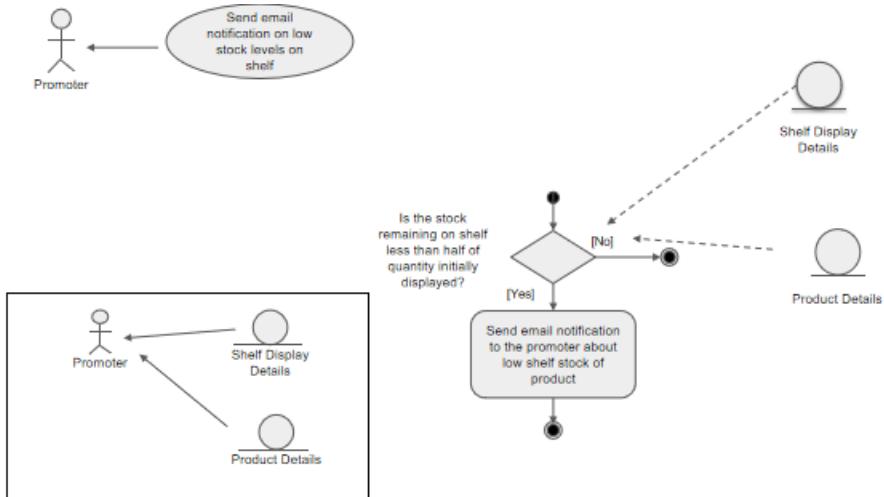


Class Diagram

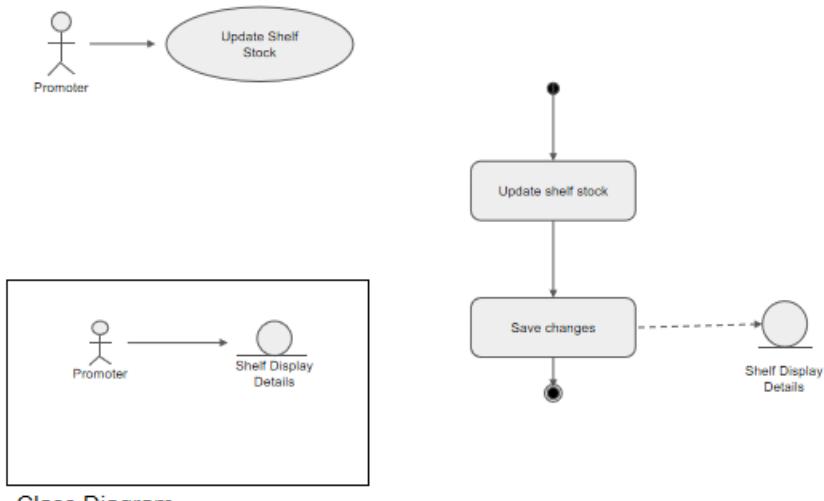


Class Diagram

## 7.4 Promoter Activity Diagrams

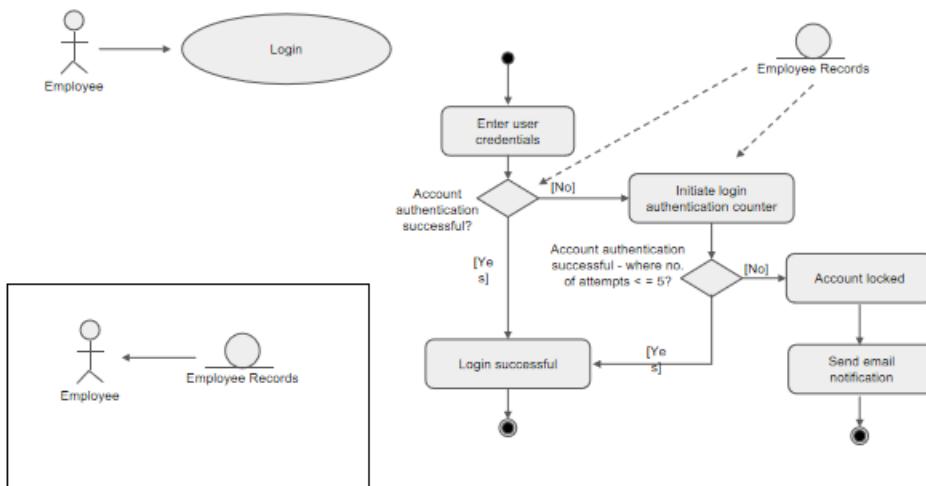


Class Diagram

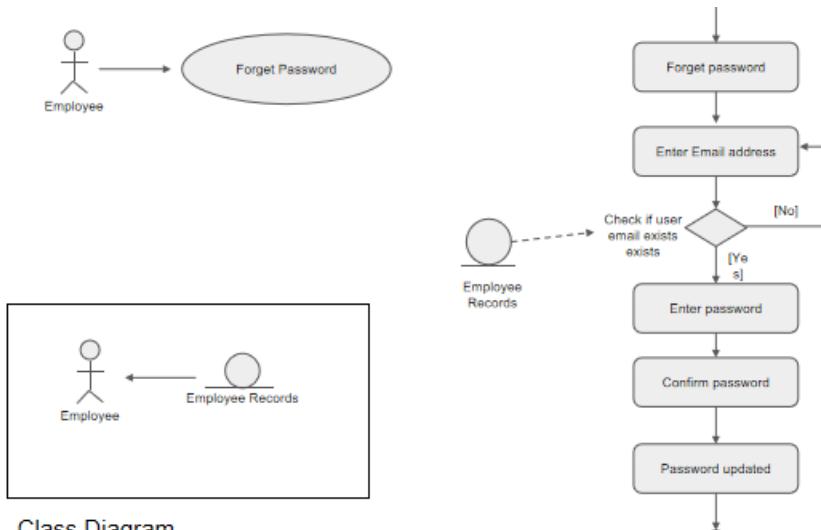


Class Diagram

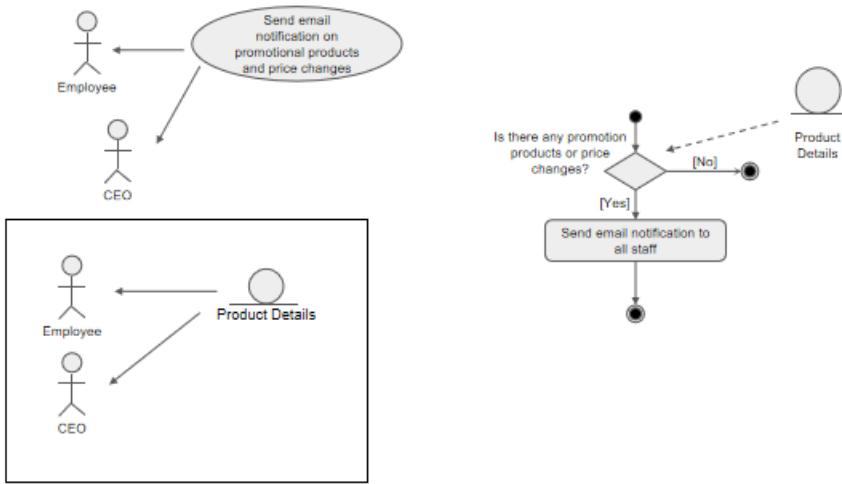
## 7.5 Employees Activity Diagrams



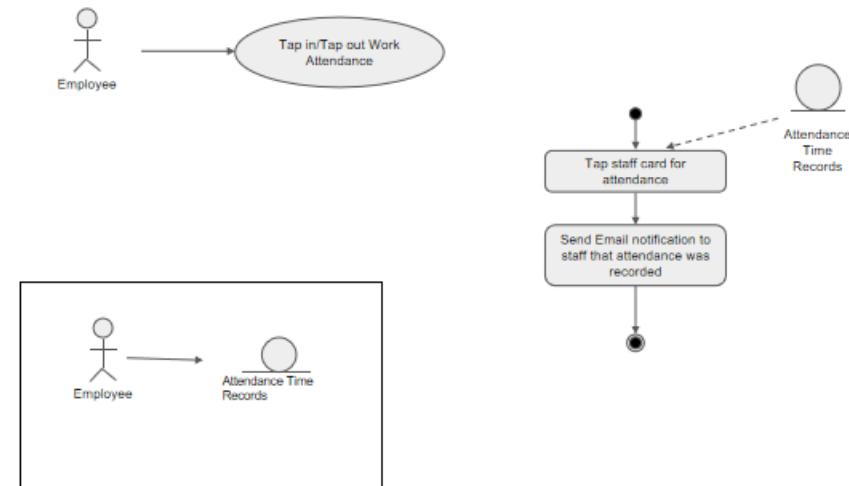
Class Diagram



Class Diagram

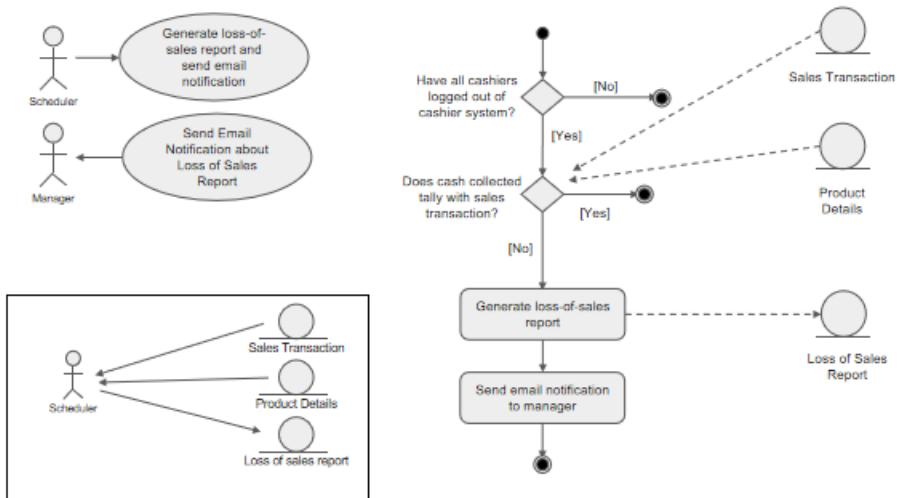


Class Diagram

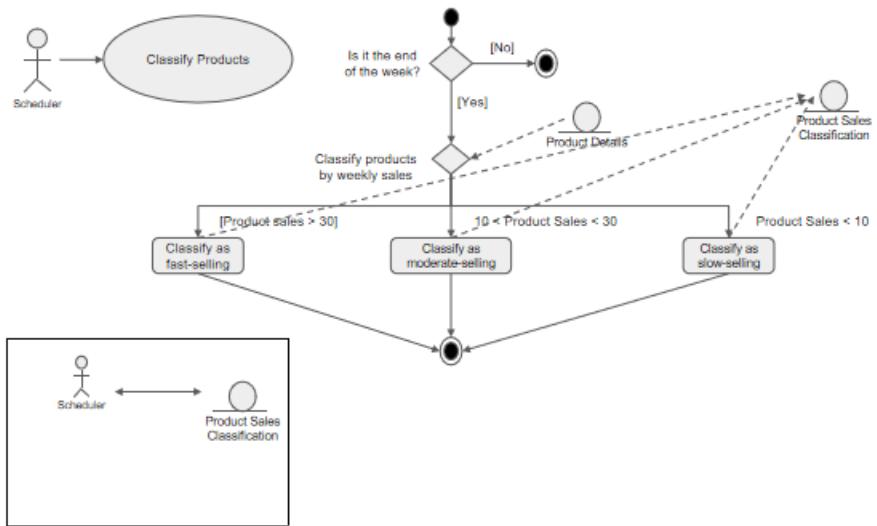


Class Diagram

## 7.6 Scheduler Activity Diagrams

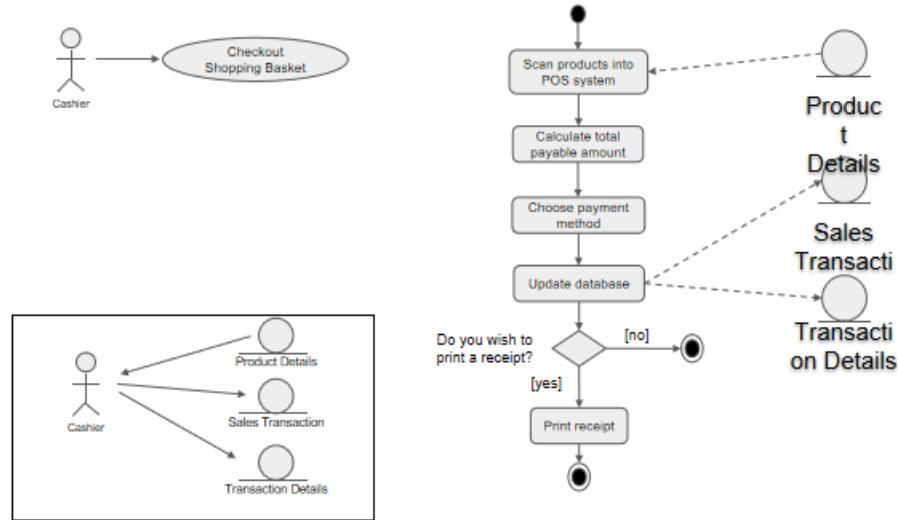


Class Diagram

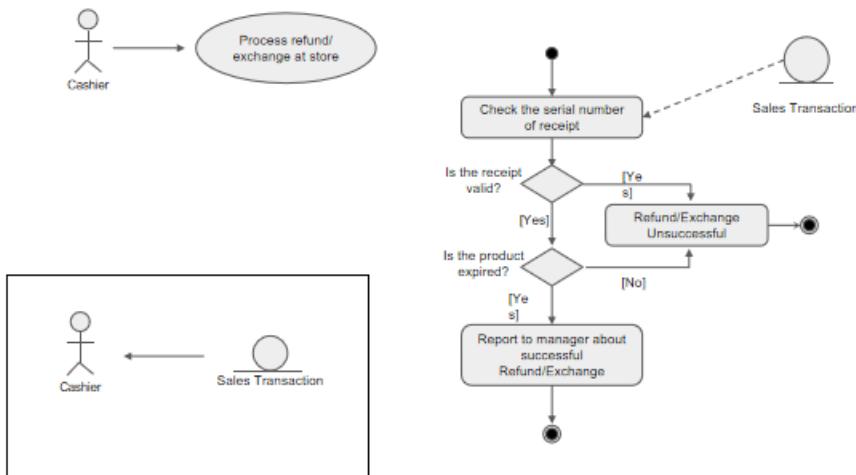


Class Diagram

## 7.7 Cashier Activity Diagrams

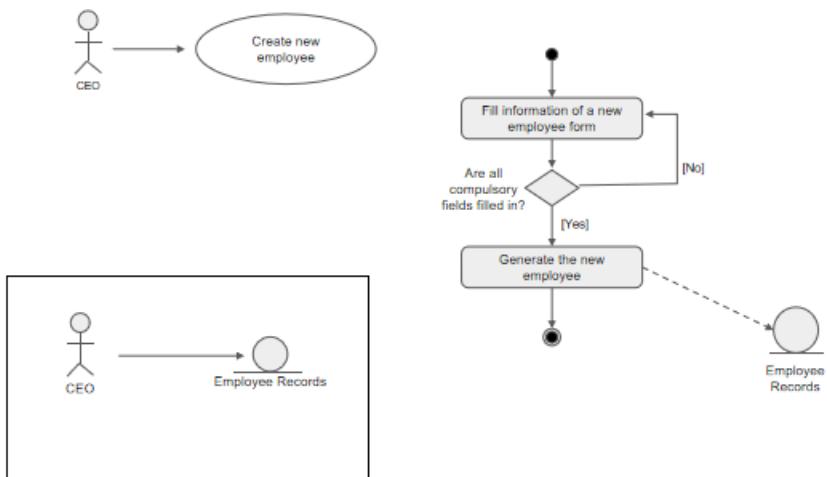


Class Diagram

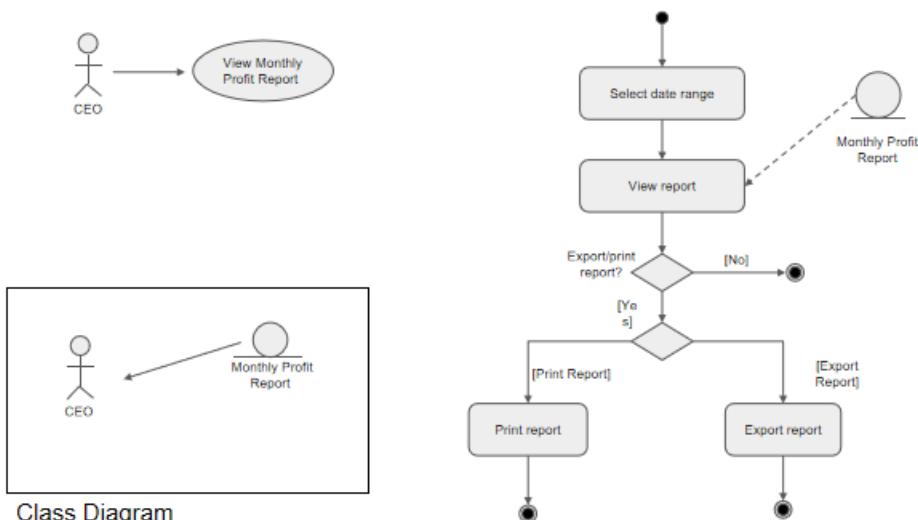


Class Diagram

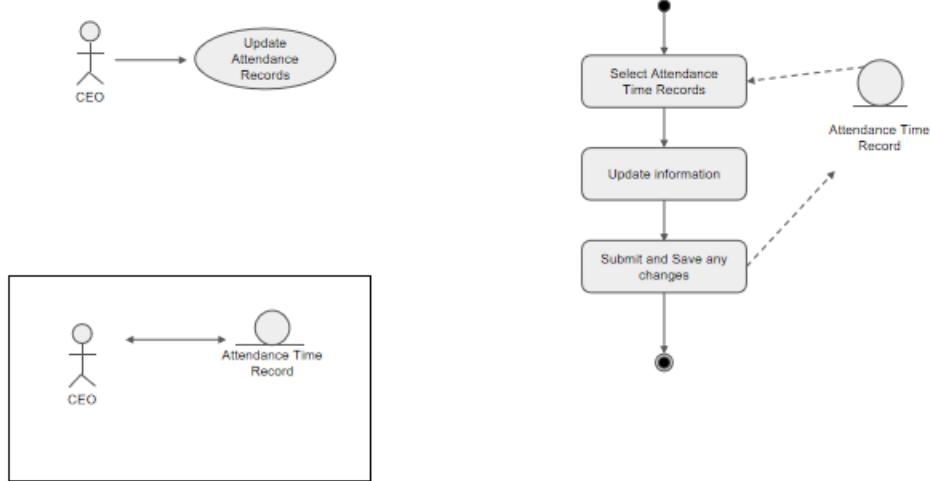
## 7.8 CEO Activity Diagrams



Class Diagram



Class Diagram



Class Diagram

## 7.9 Screen/Print out Design & Security Watermark

The following shows the user interface (UI) of customers and staffs for the online system. They contain real time updated dashboards for easy data visualization and analytics. Company logo (the grocery goods) has also been added as a security watermark in Figures 9,10 and 23 so users are assured, they are at our website and not routed to another website.

## 7.10 Customers/Public Users UI

The screenshot displays the homepage of the GetFreshFood online grocery website. At the top, there is a navigation bar with a menu icon, a logo featuring a shopping bag with a watermelon, the text "GetFreshFood", a search bar, and links for "Sign In" and "Register". A shopping cart icon is also present. On the left, a sidebar lists various categories: Promotions, Fruits & Vegetables, Meat & Seafood, Rice & Noodles, Dairy, Chilled & Eggs, Herbs & Spices, Candy, Drinks & Snacks, Beer, Wine & Spirits, Health & Beauty, Baby & Toddlers, Household, Delivery, Filter By, Health Tips, Recipes, Store Location, Contact Centre, Feedback/ Suggestions, and Check Order Status. The main content area features a banner for "UP TO 30% OFF FOR SELECTED FRUITS, VEGETABLES & DAIRY" with a "WEEKLY DEALS" section below it. This section shows five items: Strawberries (Fresh Korea Airflow), Kale Fresh New Zealand (Airflow), Avocado Mexico, Mushroom Shiitake Malaysia, and Organic Fresh Milk (Arla) Denmark. Each item has a price, discount information, and an "ADD TO CART" button. A "VIEW MORE" button is located at the bottom of the deals section.

Item	Description	Price	Discount	Action
Strawberries	Fresh Korea (Airflow)	\$12.00	30% Discount	ADD TO CART
Kale Fresh	New Zealand(Airflow)	\$7.00	30% Discount	ADD TO CART
Avocado	Mexico	\$5.00	28.5% Discount	ADD TO CART
Mushroom	Shiitake Malaysia	\$5.00	20% Discount	ADD TO CART
Organic Fresh Milk	(Arla)- Denmark	\$8.50	14.1% Discount	ADD TO CART

Figure 1: Online Website

**Promotions**

- Fruits & Vegetables
- Meat & Seafood
- Rice & Noodles
- Dairy, Chilled & Eggs
- Herbs & Spices
- Candy, Drinks & Snacks
- Beer, Wine & Spirits
- Health & Beauty
- Baby & Toddlers
- Household

**Free Delivery for purchases above \$55**

**UP TO 30% OFF**

**FOR SELECTED FRUITS, VEGETABLES & DAIRY**

**WEEKLY DEALS**

Item	Description	Quantity	Unit Price	Total Price
Strawberries Fresh Korea (Airflown)	Kale Fresh New Zealand(Airflown)	Avocado Mexico	Mushroom Shiitake Malaysia	Organic Fresh Milk (Arla)- Denmark
250g	250g	500g	300g	2x (1litre)
1 Box	1 Bag	Buy 5 for \$5	1 Packet	2 Milk Cartons
<b>30% Discount</b>	<b>30% Discount</b>	<b>28.5% Discount</b>	<b>20% Discount</b>	<b>14.1% Discount</b>
<b>\$12.00</b>	<b>\$7.00</b>	<b>\$5.00</b>	<b>\$4.00</b>	<b>\$7.30</b>
<b>\$17.15-</b>	<b>\$10.00-</b>	<b>-\$7.00-</b>	<b>-\$5.00-</b>	<b>\$8.50-</b>

**VIEW MORE**

**Figure 2:Change Quantity**

The screenshot shows a product page for 'Potato Chips Truffle (Meadows)'. At the top left is a sidebar with categories like Promotions, Fruits & Veg, Meat & Seafood, etc. The main area features a large image of a dark bag of 'TRUFFLE POTATO CHIPS' with '100% POTATOES' and 'Black Truffles' text. A purple 'Promotion' badge is visible. To the right is a circular close button. Below the main image are three smaller promotional images of different chip bags: one orange ('\$1.00'), one purple ('\$1.00'), and one yellow ('\$1.00'). Each has an 'ADD TO CART' button below it. To the right of these is a callout box with a green border containing the text 'Mix n Match-Any 3 for \$2 . Save \$1' and 'Promotion Till 31 March 2020'. At the bottom left is a section titled 'Key Information' with descriptive text about the chips.

**Promotions**

Fruits & Veg

Meat & Seafood

Rice & Noodles

Dairy, Chilled

Herbs & Spices

Candy, Drinks

Beer, Wine & Spirits

Health & Beauty

Baby & Toddler

Household

Delivery

Filter By

Health Tips

Recipes

Store Locations

Contact Centre

Feedback/ Submit

**Promotion**

**Promotion**

**Promotion**

**Potato Chips Truffle (Meadows)**

60g

1 Bag

\$1.00

**ADD TO CART**

**Mix n Match-Any 3 for \$2 . Save \$1**  
Promotion Till 31 March 2020

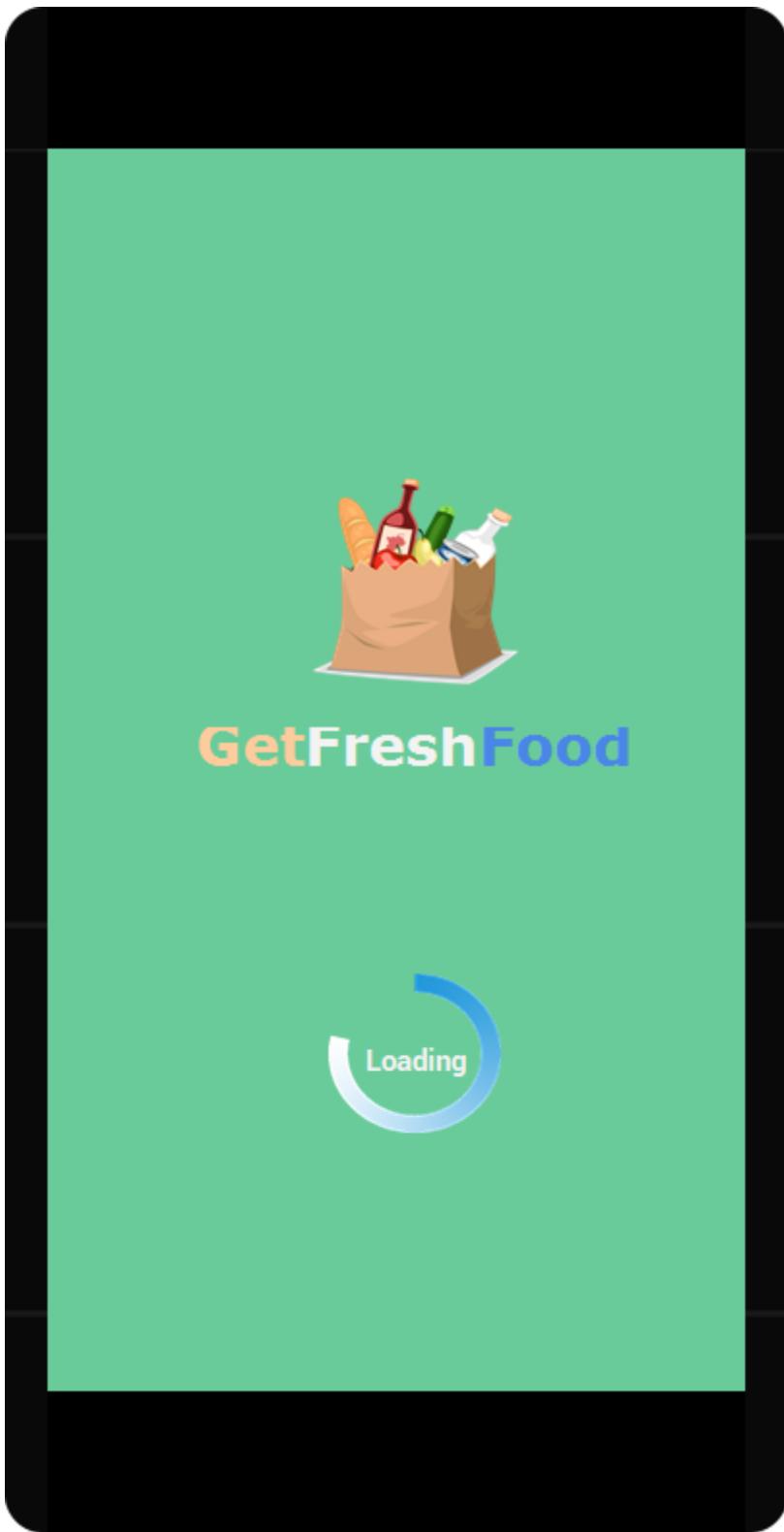
**Key Information**

Indulge in our 100% crunchiness that are specially made from exotic black summer truffles. Crunchy ridge-cut potato chips are smothered with the finest grade of olive, then tossed with generous bits of black truffles, and a hint of parsley for that finishing touch.

**Country of Origin**

Malaysia

**Figure 3:Product Details**



**Figure 4:Mobile Loading Screen**

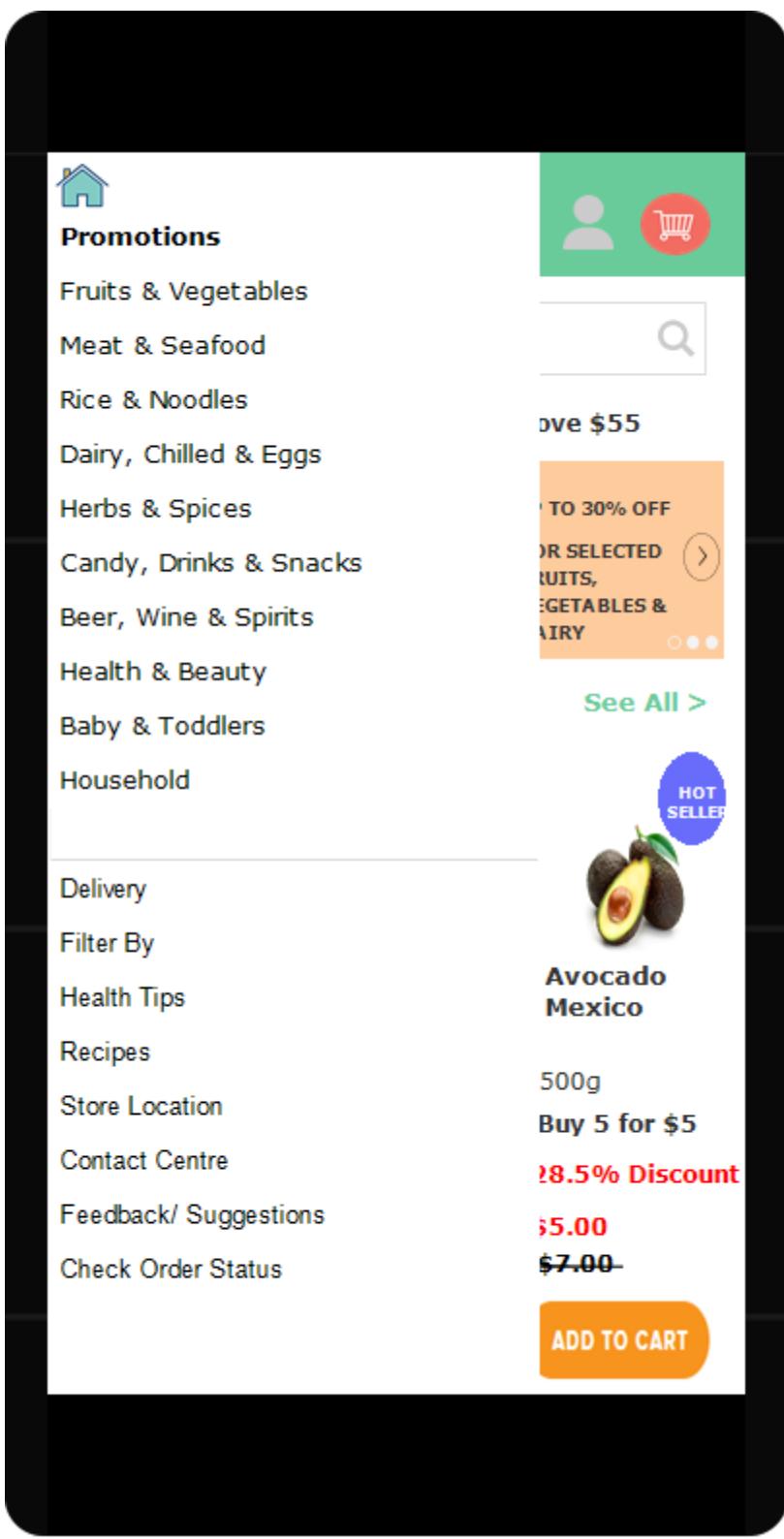


Figure 5: Mobile Menu

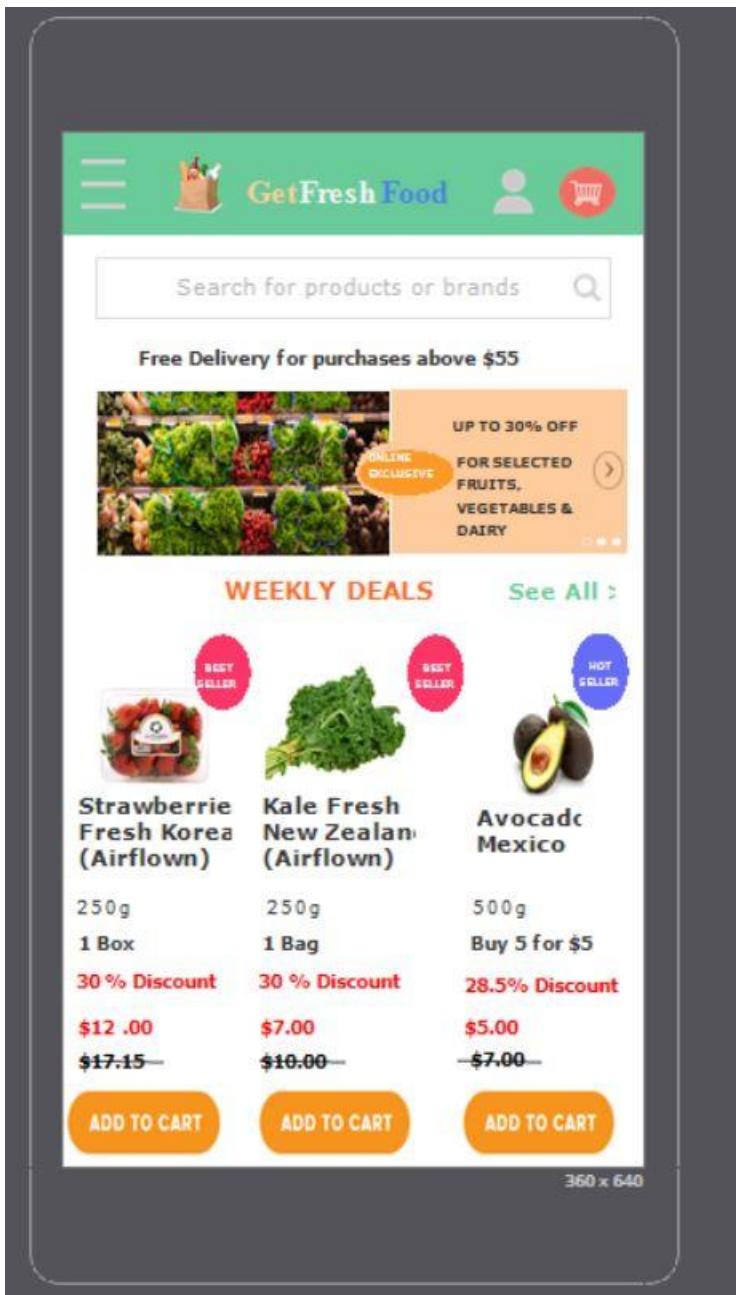


Figure 6: Mobile Menu

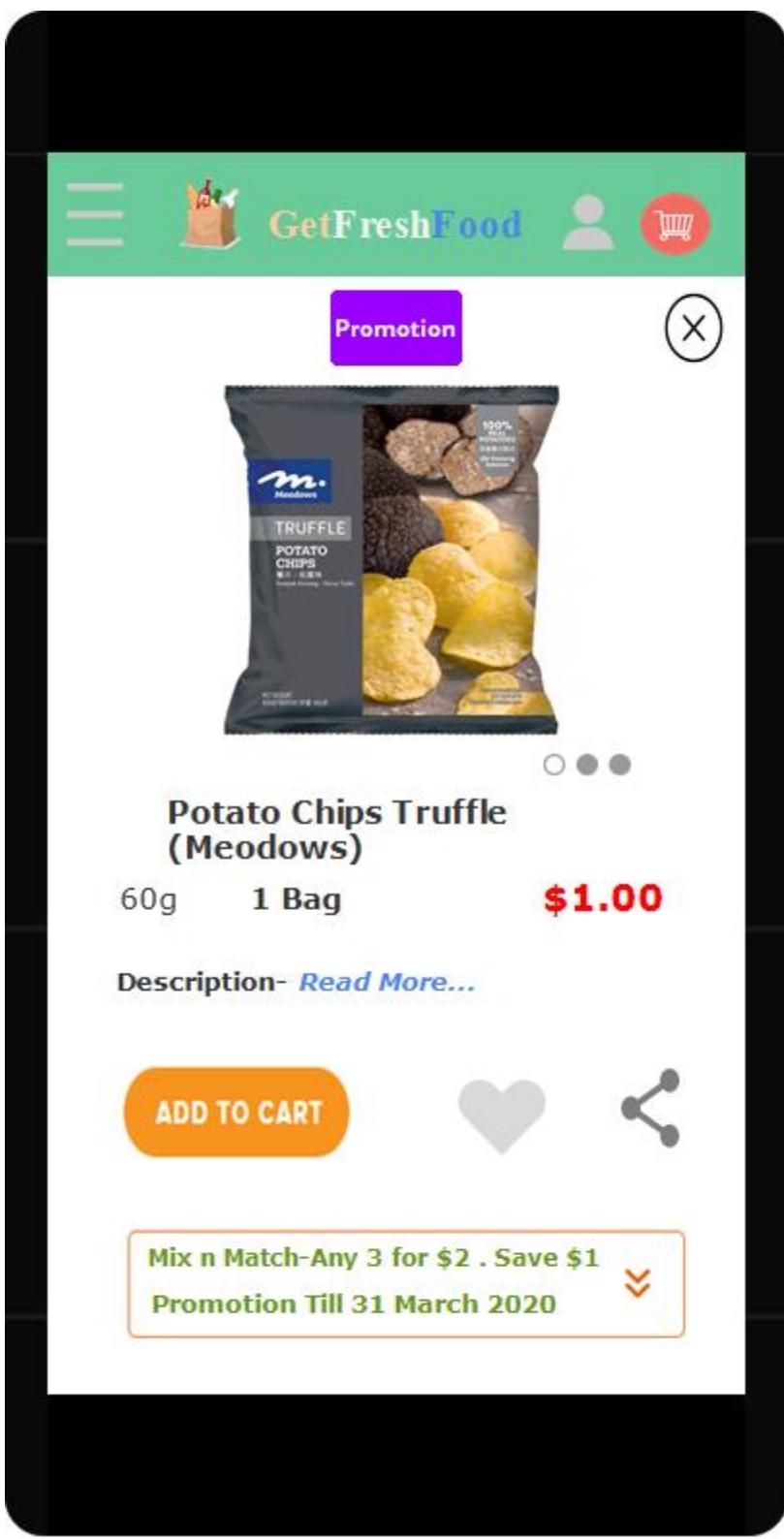


Figure 7: Mobile Product Details

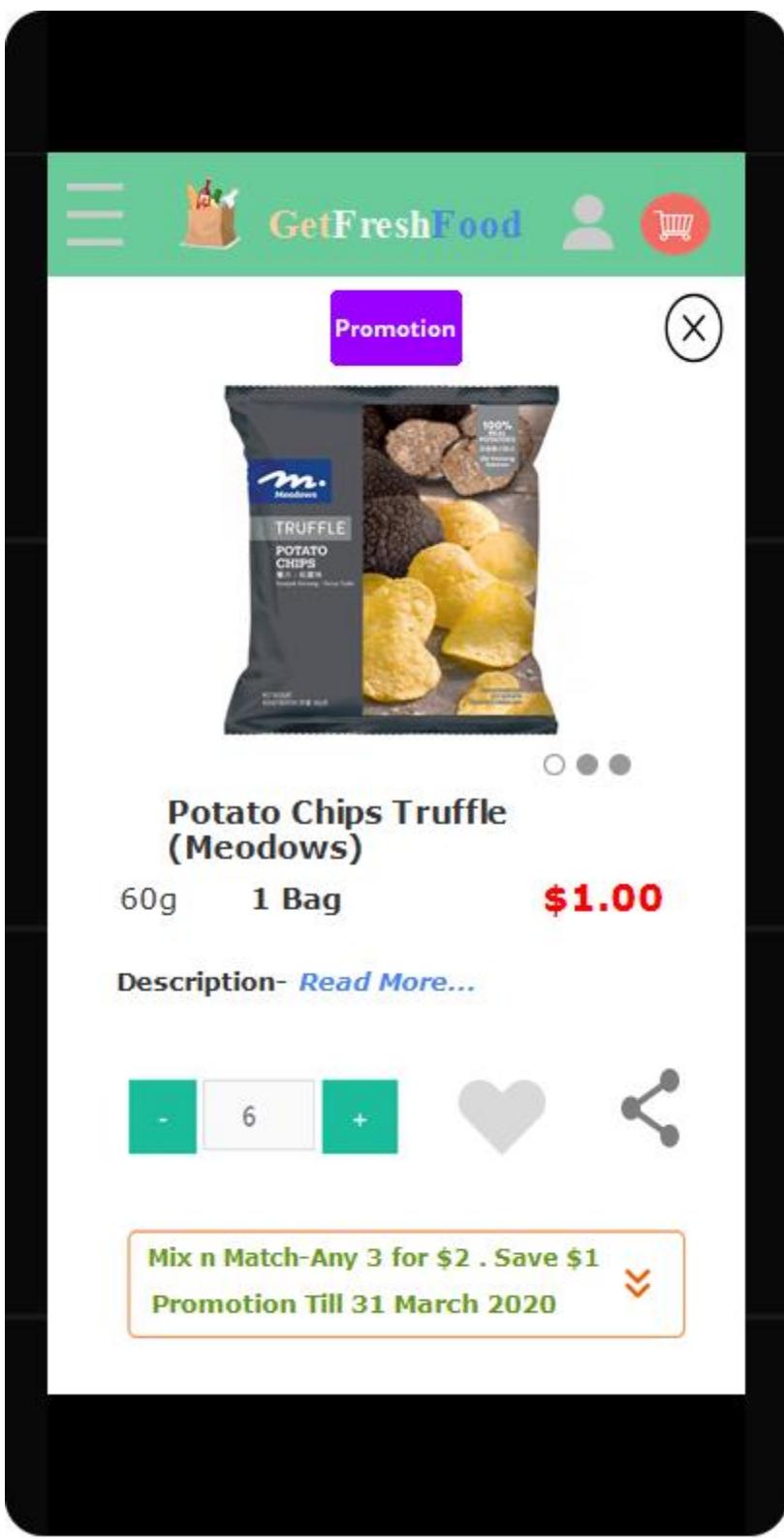
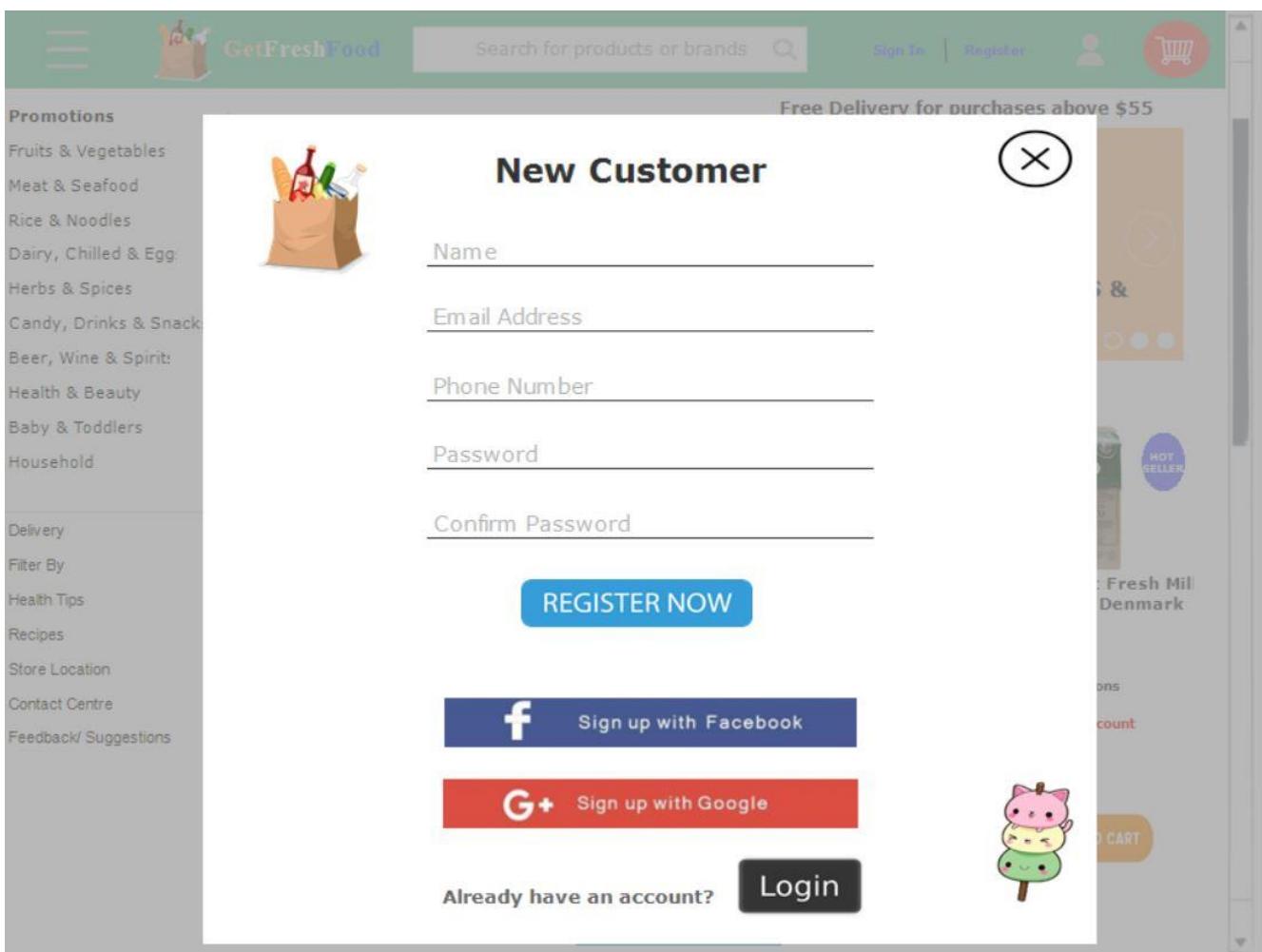


Figure 8: Mobile Product Details (Change Quantity)



**Figure 9: New Customer Sign Up, - Company logo (the grocery goods) has been added as a security watermark so users are assured, they are at our website and not another website.**

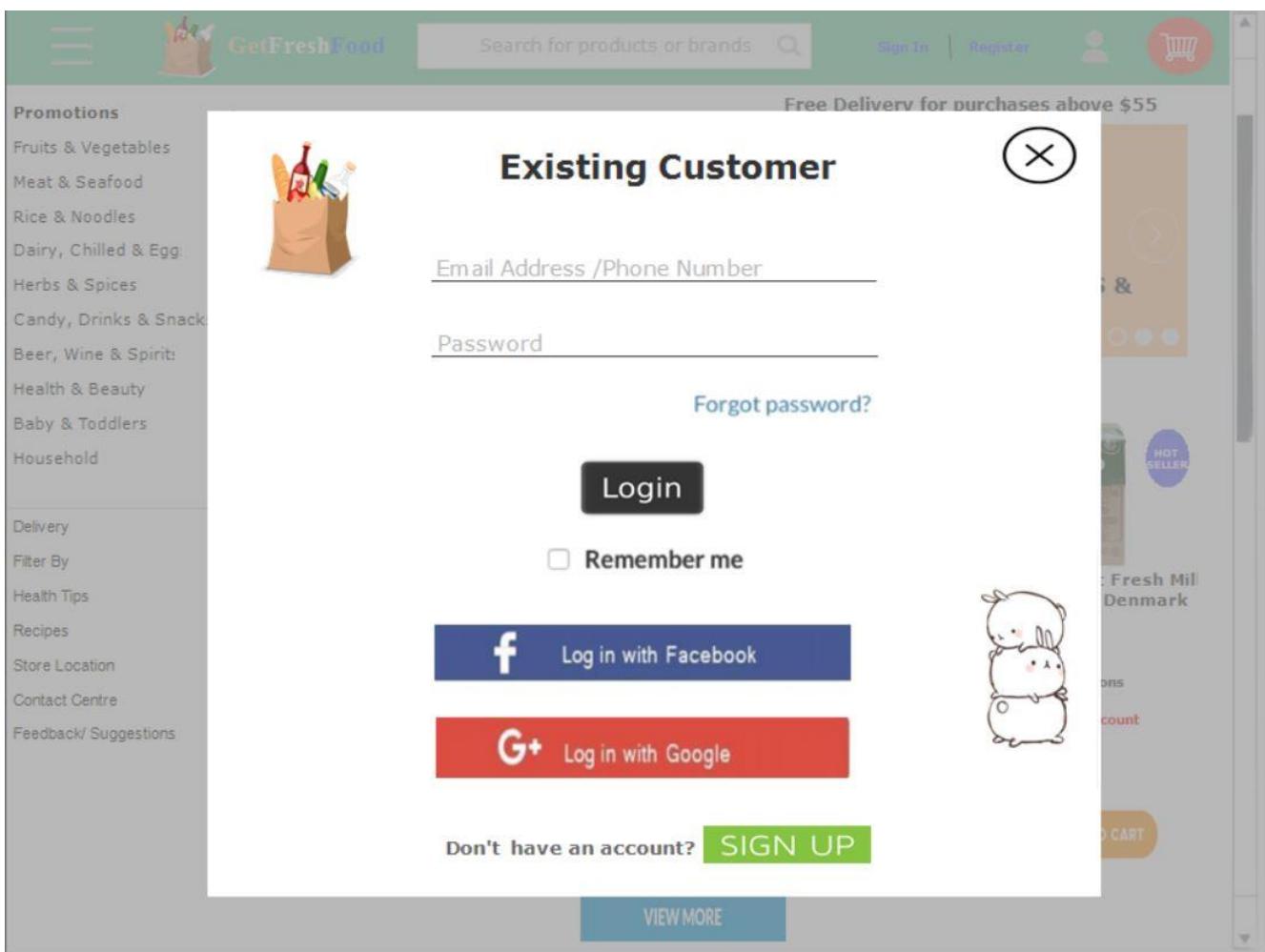


Figure 10: Login for Existing Customers

The screenshot shows the GetFreshFood website's shopping cart page. At the top, there is a navigation bar with a menu icon, the logo 'GetFreshFood' featuring a shopping bag icon, a search bar with placeholder text 'Search for products or brands', 'Sign In | Register' links, and a user profile icon. A shopping cart icon with a '3' notification is also present.

**Free Delivery for purchases above \$55**

**FREE Ceramic Fruit Bowls**  
Worth \$12  
With Minimum Spend \$30 of Shokubutsu Soup Products

**CART**

Product	Quantity	Price	Total	Enter Promo Code here		APPLY
Strawberries Fresh Korea (Airflown)	<b>6</b>	<b>\$12.00</b>	<b>\$72.00</b>	SUBTOTAL		<b>\$80.30</b>
	<b>Remove</b>	250g		Delivery Fees		<b>\$5.00</b>
Organic Fresh Milk (Arla)- Denmark	<b>1</b>	<b>\$7.30</b>	<b>\$7.30</b>	<b>TOTAL</b> (7% GST inclusive)		<b>\$85.30</b>
Chewy Candy Strawberry (HI-CHEW)-Japan	<b>1</b>	<b>\$1.00</b>	<b>\$1.00</b>			

**CHECKOUT**

Figure 11: Online Cart

The screenshot shows the GetFreshFood website's checkout interface. At the top, there is a green header bar with a menu icon, the logo 'GetFreshFood' featuring a shopping bag icon, a search bar with the placeholder 'Search for products or brands', 'Sign In | Register' links, and a shopping cart icon with a '3' notification. Below the header, a promotional banner for 'Free Ceramic Fruit Bowls' is displayed, stating they are worth \$12 and available with a minimum spend of \$30 on Shokubutsu Soup Products. To the right of the banner is a section for payment status, showing 'Complete' for Payment, Delivery, Address, and Products. The main checkout area is titled 'Checkout' and contains two large buttons: 'CHECKOUT AS GUEST' (in a black box) and 'CHECKOUT AS CUSTOMER' (in an orange box). A vertical scroll bar is visible on the right side of the page.

Free Delivery for purchases above \$55

**FREE Ceramic Fruit Bowls**

Worth \$12  
With Minimum Spend \$30 of Shokubutsu Soup Products

Complete

Payment   
Delivery   
Address   
Products

**Checkout**

CHECKOUT AS GUEST

CHECKOUT AS CUSTOMER

Figure 12: Checkout as Guest or Customer

**Free Delivery for purchases above \$55**

**FREE Ceramic Fruit Bowls**  
Worth \$12  
With Minimum Spend \$30 of Shokubutsu Soup Products

Complete

Payment

Delivery

Address

Products

**Address**

<b>Postal code</b>	<b>520305</b>		<input type="checkbox"/> Save this delivery address
<b>Address</b>	Block 305, Tampines Avenue 7, Street 32		
<b>Name</b>	<input type="text"/>		
<b>Unit No</b>	<input type="text"/>		
<b>Phone</b>	<input type="text"/>		
<b>Additional Information</b>	<input type="text"/>		

**NEXT**

**Figure 13: Address Form**

**GetFreshFood**

Search for products or brands

Sign In | Register

**Free Delivery for purchases above \$55**

**FREE Ceramic Fruit Bowls**  
Worth \$12  
With Minimum Spend \$30 of Shokubutsu Soup Products

**Complete**

**Payment**   
**Delivery**   
**Address**   
**Products**

### Confirm Order and Payment

Your Order	Order No	Delivery Slot	Date
6 quantity	123456687A	SUBTOTAL	<b>\$80.30</b>
1 quantity		Delivery Fees	<b>\$5.00</b>
1 quantity		<b>TOTAL</b>	<b>\$85.30</b> (7% GST inclusive)
<b>Checkout as</b>	Guest	<b>Make Payment Now</b>	
<b>Address</b>	Block 305, Tampines avenue 7, Street 32, S520305	<input checked="" type="radio"/> <input type="radio"/>	

**Figure 14: Confirm Order and Make Payment**

GetFreshFood

Search for products or brands

Sign In | Register

Free Delivery for purchases above \$55

FREE Ceramic Fruit Bowls

Worth \$12  
With Minimum Spend \$30 of Shokubutsu Soup Products

Shokubutsu Soup Products

## Track Order Status

Please enter Order No to track its status.

Order No 123456687A

Order Processing (checkmark icon)

Order Packed

Delivery in Progress

Delivery Successful

Print Receipt

Send Receipt to Email

Figure 15: Order Status

The screenshot shows the GetFreshFood mobile application interface. At the top, there is a green header bar with a menu icon (three horizontal lines), the logo 'GetFreshFood' (a shopping bag with a fork and knife), a search bar ('Search for products or brands'), a user profile icon ('Kikki Gan'), a notification bell icon with a red badge, and a shopping cart icon.

The main content area displays a user profile for 'Kikki Gan' with options to 'Edit Profile' and 'Delete Account'. Below this, a section titled 'View Order History' is shown. To the right of this section is a 'Filter By' button with a funnel icon.

A table lists three order history entries:

Order No	Paid On	Estimated Delivery Date	Status
123456689A	Sunday, 15 March 2020, 9pm	Saturday, 21 March 2020, 10am-12pm	Order Processing pending.
123456688B	Friday, 13 March 2020, 8pm	Tuesday, 17 March 2020, 4pm-6pm	Delivered Successfully on Tuesday, 17 March 2020, 4.30pm
123456687C	Wednesday, 11 March 2020, 7pm	Saturday, 21 March 2020, 1pm-3pm	Delivered Successfully on Sunday, 15 March 2020, 2.40pm

Figure 16: Customer Profile Details and Order History

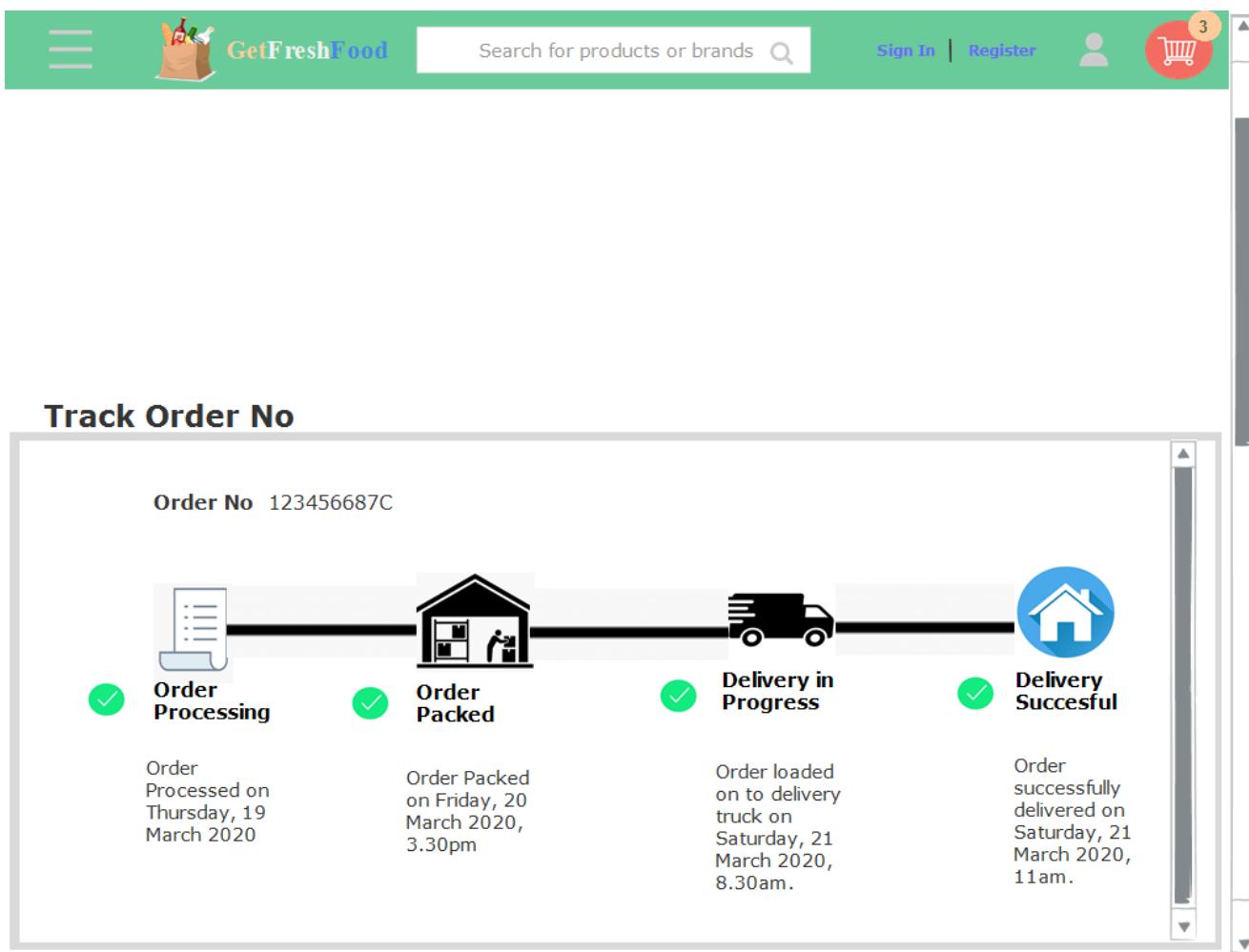


Figure 17: Order Status upon clicking Order History(Figure 16)

The screenshot shows the homepage of the GetFreshFood website. At the top, there is a navigation bar with a menu icon, the logo 'GetFreshFood' featuring a shopping bag icon, a search bar with the placeholder 'Search for products or brands', and links for 'Sign In' and 'Register'. A shopping cart icon with a '3' notification is also present. A promotional banner at the top right offers 'Free Delivery for purchases above \$55'. Below the banner, there is an image of several colorful ceramic fruit bowls filled with fruit slices. Text on the banner says 'FREE Ceramic Fruit Bowls' (Worth \$12) and 'With Minimum Spend \$30 of Shokubutsu Soup Products'. To the right of the banner, there is an image of three bottles of Shokubutsu soup.

## Track Order No

This screenshot shows the order tracking interface. It features a form where users can enter their order number to track its status. The input field contains the placeholder 'E.g. 123456687B' and a green 'SUBMIT' button. Below the form, a horizontal timeline illustrates the delivery process through four stages: 'Order Processing' (document icon), 'Order Packed' (house icon with a person), 'Delivery in Progress' (truck icon), and 'Delivery Successful' (blue house icon). Each stage is accompanied by a small progress bar below it.

Figure 18: Variation of Tracking Order No for Guest without Account

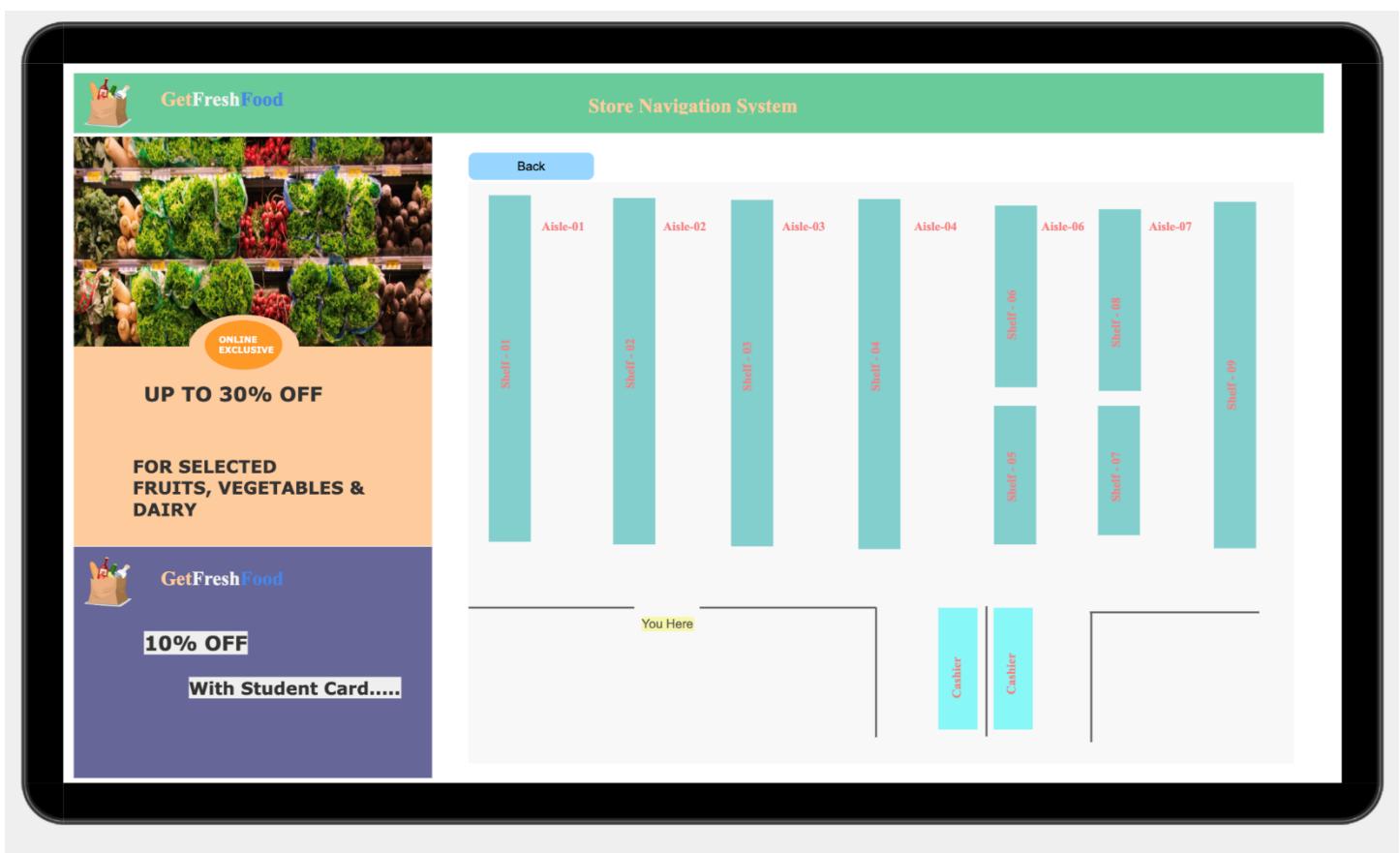
≡
GetFreshFood
Search for products or brands 
Sign In | Register

## Refund & Exchange

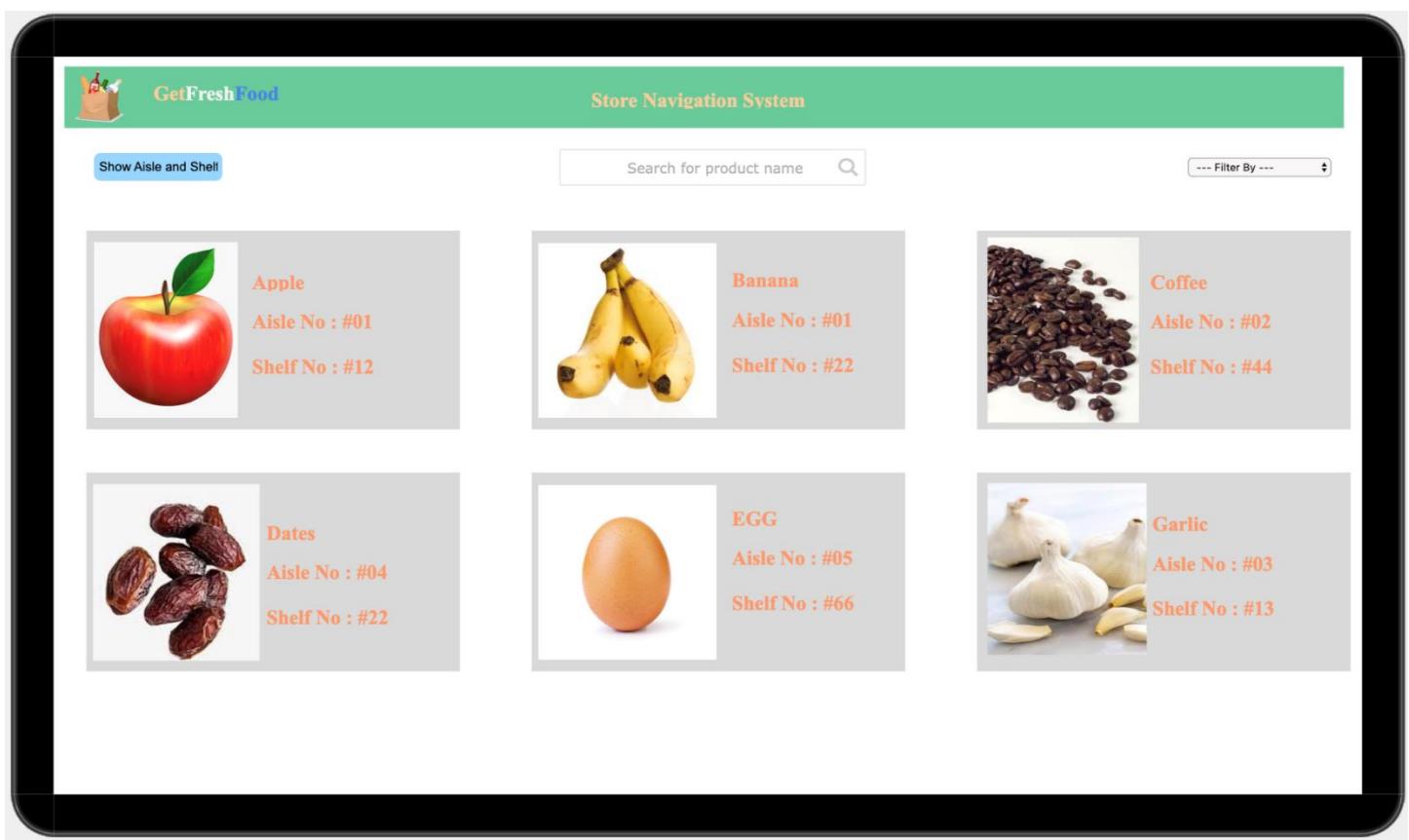
Please fill in all the fields

<b>Order No</b>	<input style="width: 80%; height: 25px; border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;" type="text"/> E.g. 123456687C
<b>Product Names &amp; Codes(separated with ',')</b>	<input style="width: 80%; height: 100px; border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;" type="text"/> <p>E.g. Potato Chips Truffle (Meadows) , 120000000A, Mango Fresh- Malaysia, 126775555F</p> <p>(Product Code is the 10 digit barcode number you find on the price tag)</p>
<b>Request</b>	<input checked="" type="radio"/> Exchange <input type="radio"/> Return
<b>Reason</b>	<input checked="" type="checkbox"/> Damaged <input checked="" type="checkbox"/> Expired
<b>Exchange where</b>	<input checked="" type="radio"/> Physical Store <input type="radio"/> Home Pickup (+\$6)
<b>Upload Photo of Damaged/Expired Products</b>	<input style="width: 150px; height: 30px; background-color: #ccc; border: 1px solid #ccc; border-radius: 5px; font-weight: bold; color: black; font-size: 0.8em;" type="button" value="UPLOAD"/>
<b>Describing where is damaged/expired</b>	<p>E.g. Potato Chips Truffle was best before 28 January 2020 on the packaging and I received these expired chips on 30 January 2020.</p> <p>E.g. Pickled Lettuce jar seal was broken when I bought it on 30 January 2020.</p>
<input style="width: 150px; height: 30px; background-color: #557744; border: 1px solid #557744; border-radius: 5px; font-weight: bold; color: white; font-size: 0.8em;" type="button" value="SUBMIT"/>	

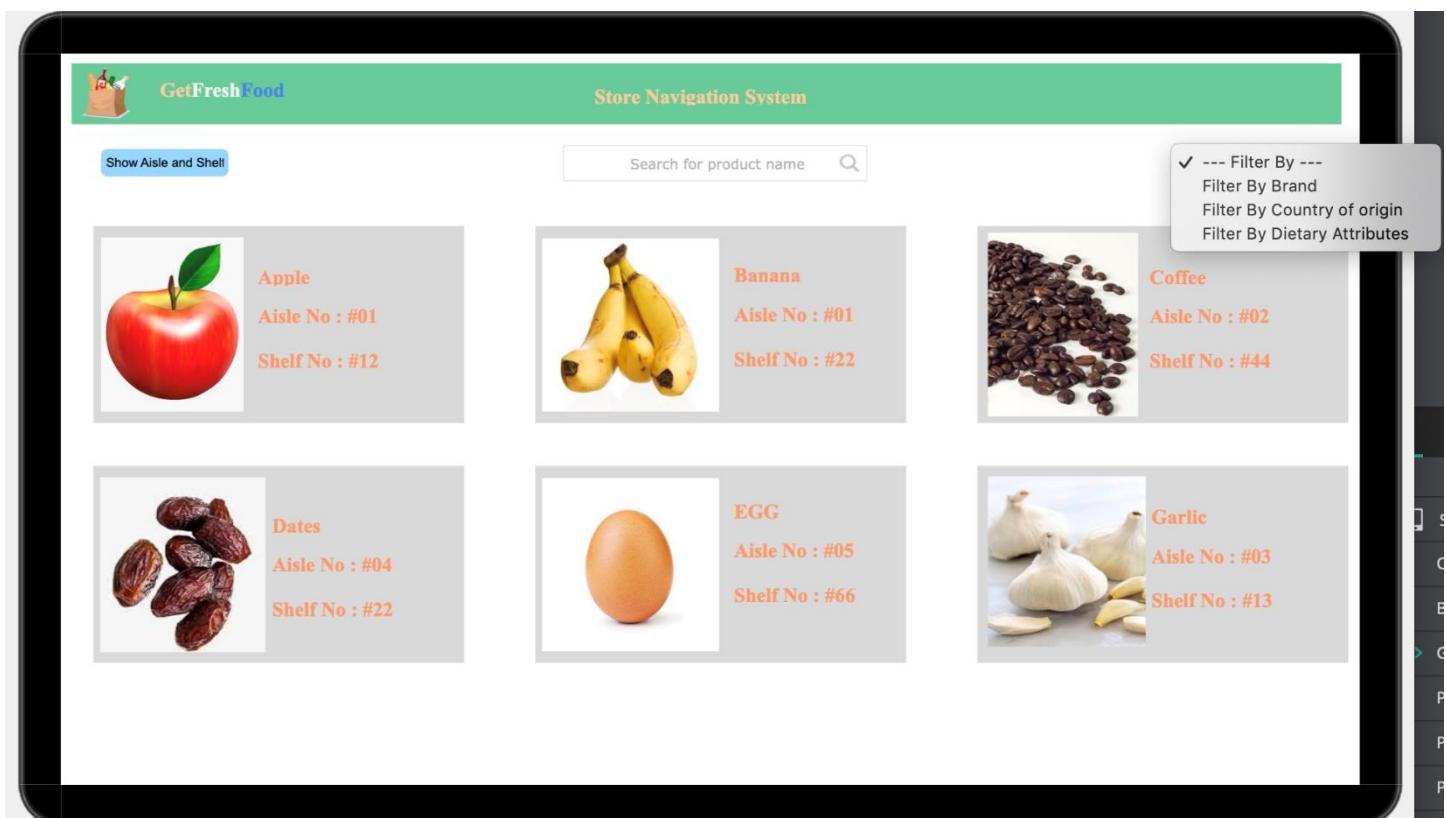
**Figure 19: Refund and Exchange Form**



**Figure 20: Store Navigation System**



**Figure 21: Store Navigation System Search**



**Figure 22:Store Navigation System (Filter By)**

## 7.11 Staff Login

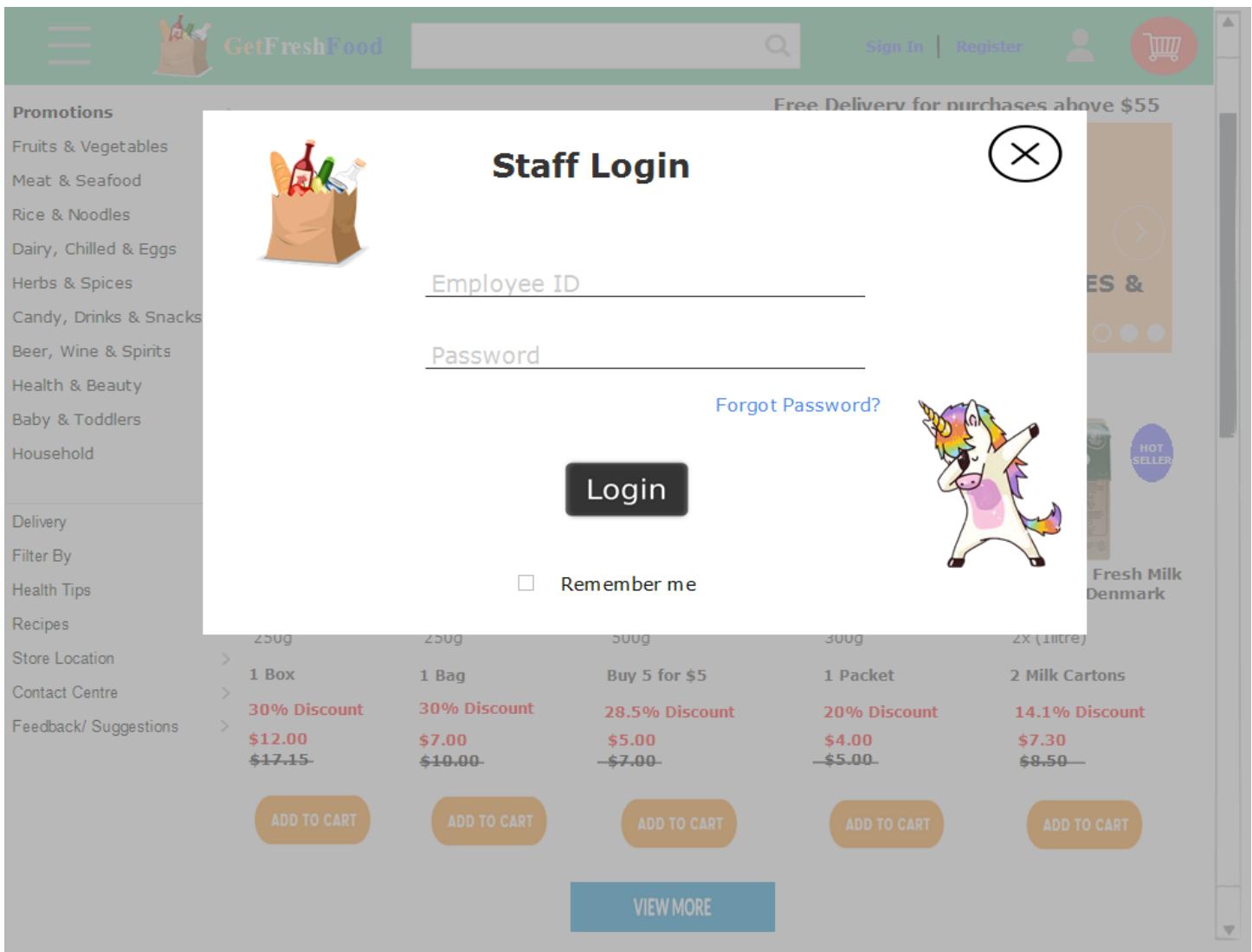


Figure 23: Staff Login

## 7.12 Manager UI

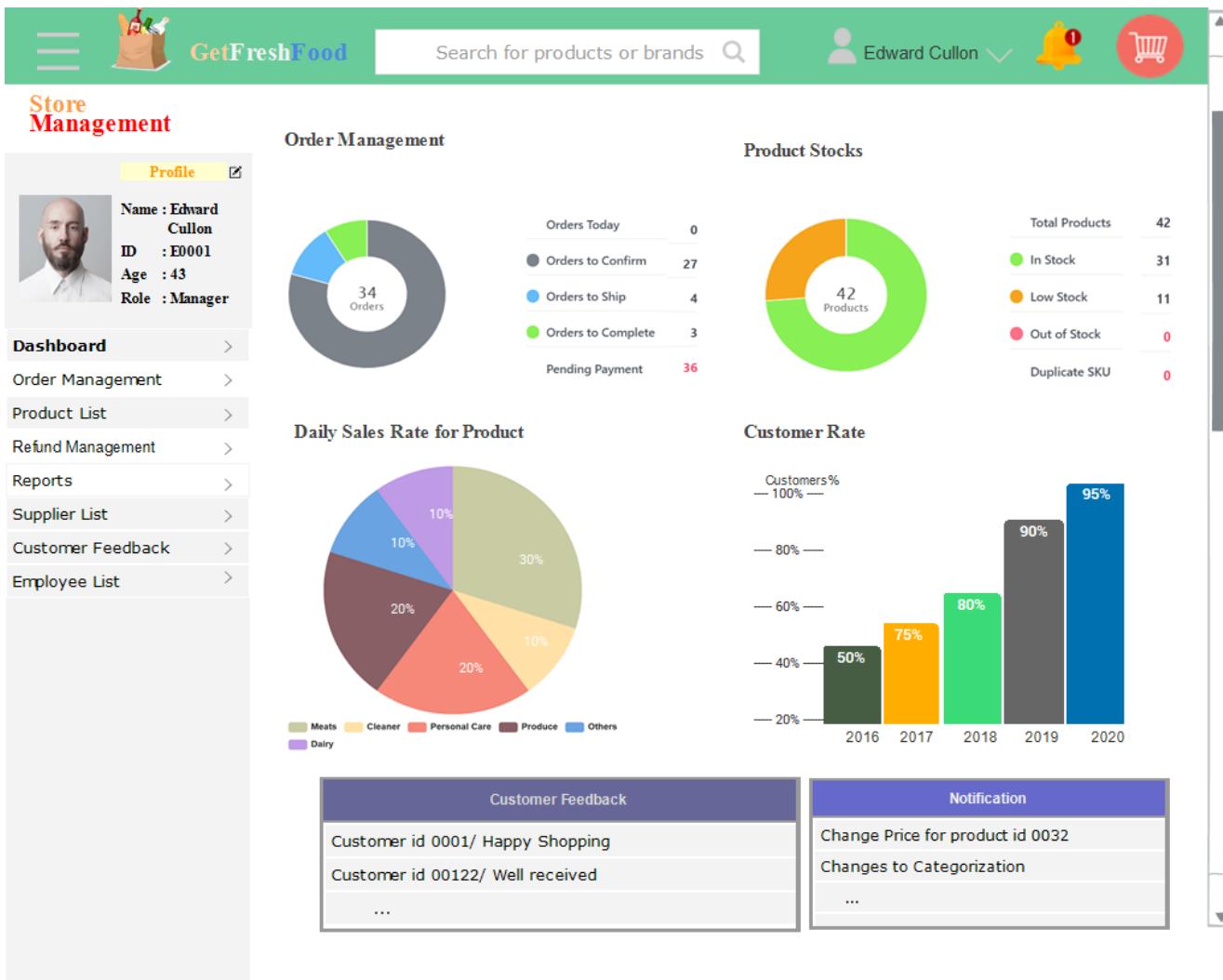
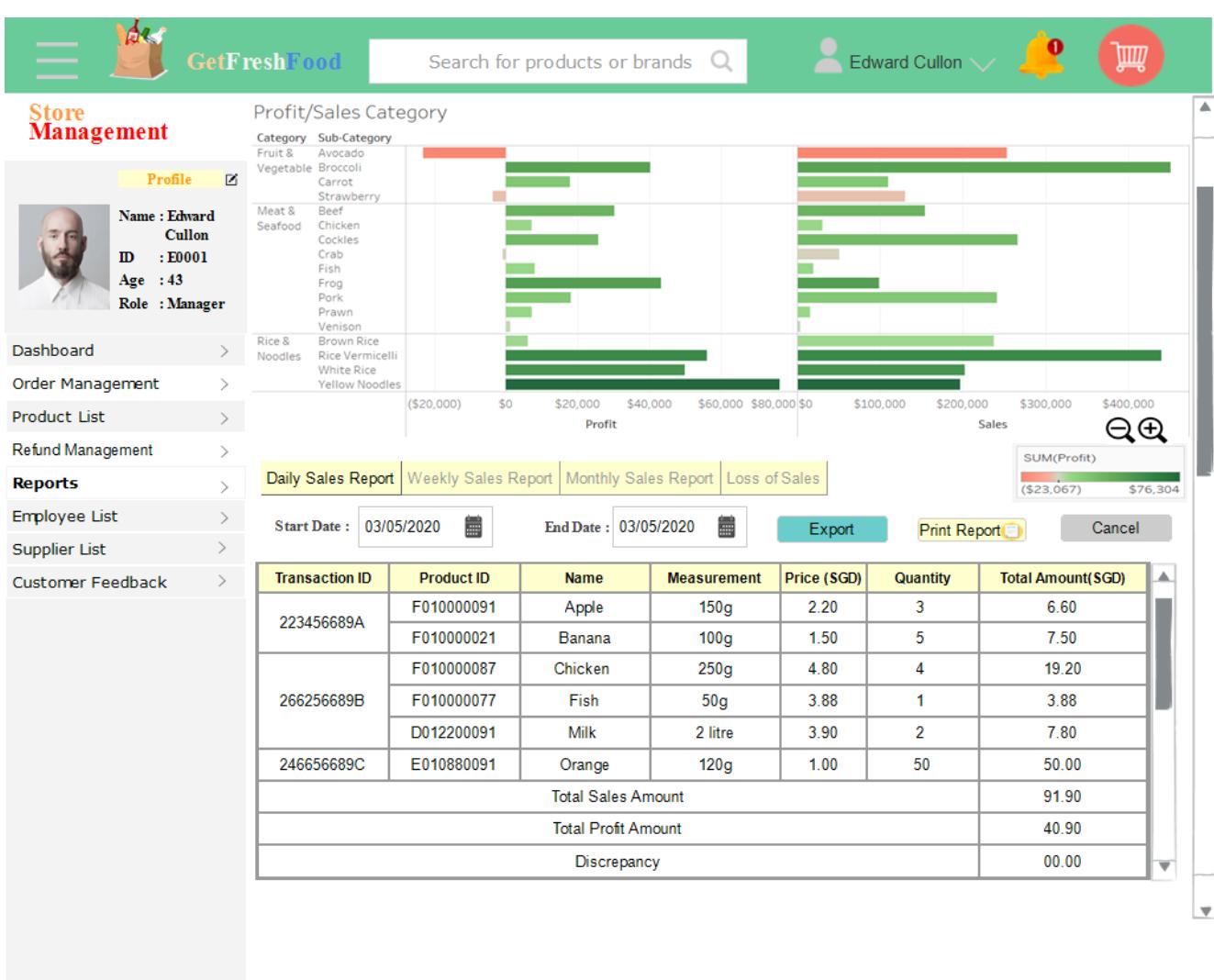
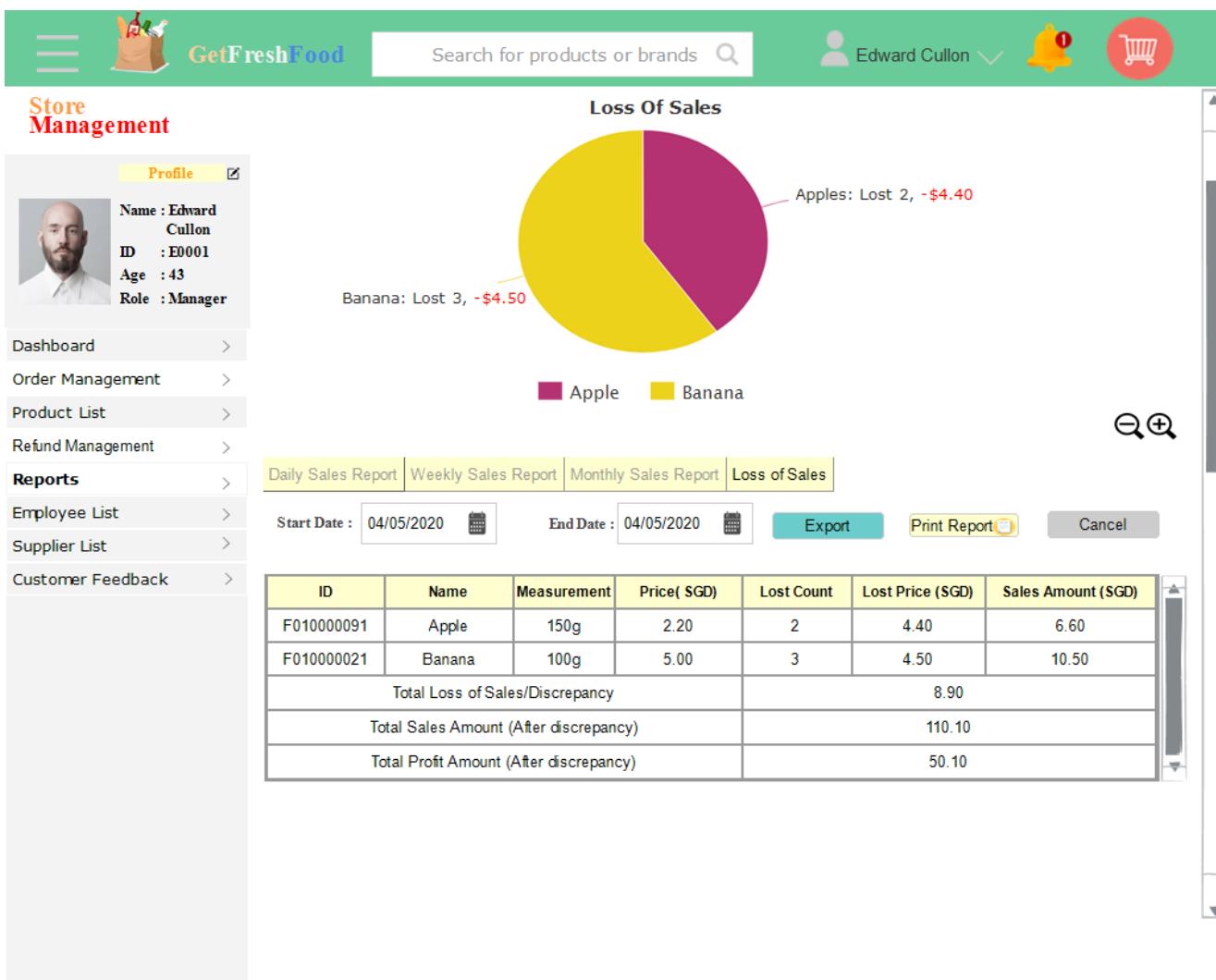


Figure 24: Real Time Updated Dashboard of Manager



**Figure 25: Automated Report Generation with Data Visualization (Charts) and Table Data**



**Figure 26: Loss of Sales Report Generation**

FD996B



# GetFreshFood

Search for products or brands
Edward Cullon

## Store Management

### Refund Management

**Profile**



Name : Edward Cullon  
ID : E0001  
Age : 43  
Role : Manager

- [Dashboard](#)
- [Order Management](#)
- [Product List](#)
- [Refund Management](#)
- [Reports](#)
- [Supplier List](#)
- [Customer Feedback](#)
- [Employee List](#)

Show s **10** Entities

**Filter By**

**Search :**

No	Date Submitted	Case ID	Submitted By	Items Types	Request	Status
01	29 March 2020	C1010	Kikki Gan	1	Refund	Pending
02	29 March 2020	C1009	Bean Bean	2	Exchange	Pending
03	29 March 2020	C1008	Noga Bao	1	Refund	Pending
04	27 March 2020	C1007	Han Hun	1	Exchange	Approved
05	28 March 2020	C1006	Finni Chou	1	Refund	Rejected

**Case ID** **C1010**

**Submitted By** Kikki Gan

**Order No** 123456687C

**Product Name & Code** Mango Fresh- Malaysia, 126775555F

**Request** Refund

**Reason** Damaged

**Return Where** Physical Store

**Description** Mango had worms inside when i cut open. I bought them on 28 March 2020, one day ago.

**Photo**



**Message**

Dear Kikki Gan,

Thank you. We will refund you accordingly. Please come to the store tomorrow from 12pm onwards to return the spoilt mango.

**Approve** **Reject**

**Figure 27: Refund Management**

The screenshot shows the GetFreshFood application interface. At the top, there is a green header bar with a search bar containing "Search for products or brands" and a magnifying glass icon. To the right of the search bar are user profile icons for "Edward Cullon" and a notification bell with a red badge. A shopping cart icon is also present.

**Store Management**

**Employee List**

**Profile**

Name : Edward Cullon  
ID : E0001  
Age : 43  
Role : Manager

**Create New Employee**

Show s **10** Entities

**Filter By**

**Search :**

ID	Name	Role	Start Date	Phone	Address	E-mail	Options
E0021	Jennifer Hewitt	Promoter	01/01/2008	93244251	Holland	jenniferht@gff.com.sg	
E0012	Ann Holland	Casher	02/02/2008	84561225	Dover	annhd@gff.com.sg	
E0008	Tom Hendrickson	Store Man	05/04/2002	98554622	Red Hill	tomhn@gff.com.sg	
E0001	Edward Cullon	Manger	03/03/2002	99652311	Clementi	edwardcn@gff.com.sg	

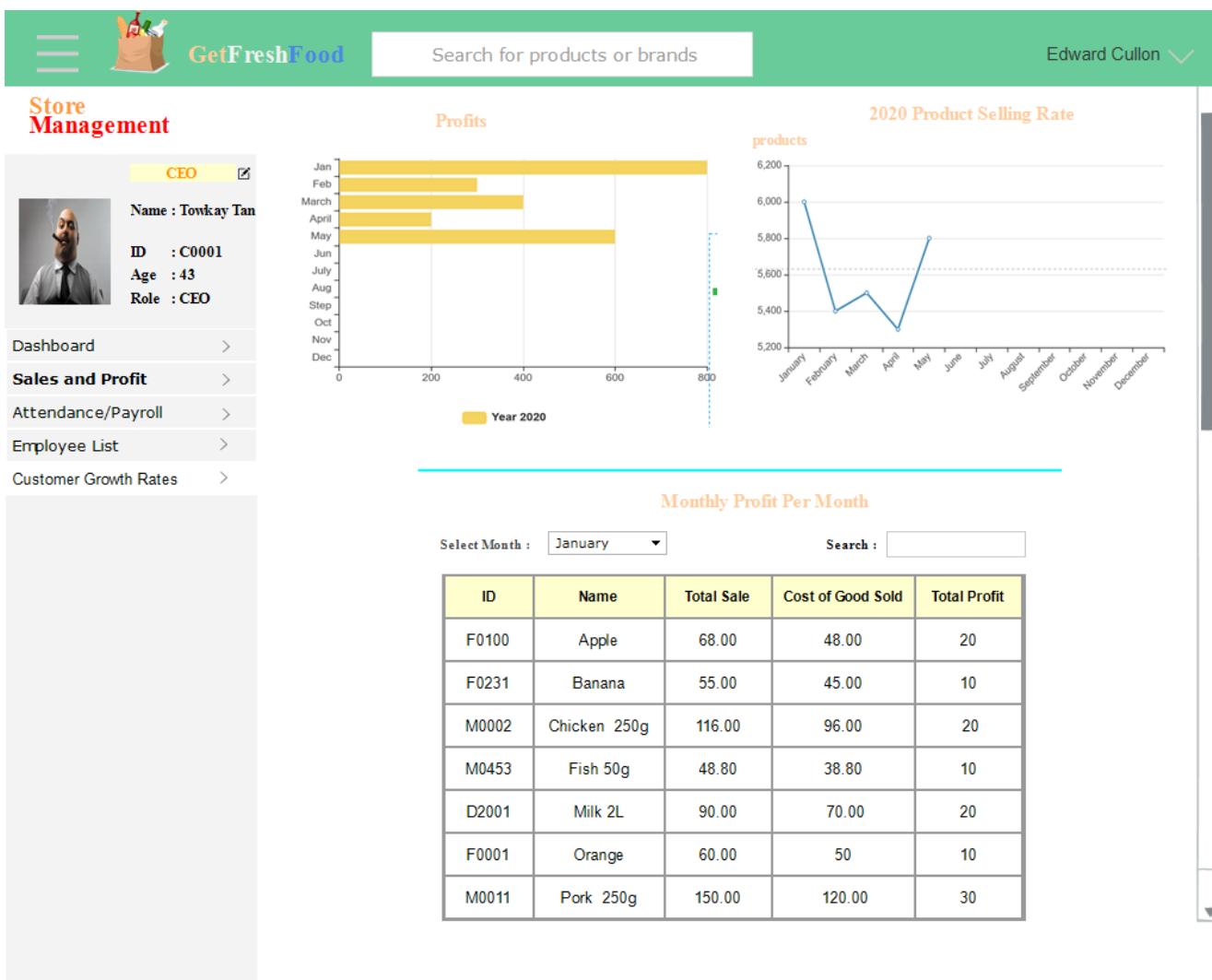
**Dashboard** >  
**Order Management** >  
**Product List** >  
**Refund Management** >  
**Reports** >  
**Supplier List** >  
**Customer Feedback** >  
**Employee List** >

**Figure 28: Employee List (Manager View)**

## 7.13 CEO UI



Figure 29: Real Time Updated Dashboard of CEO



**Figure 30: Sales and Profit**

The screenshot shows a web-based application interface for 'Store Management'. At the top, there is a navigation bar with a logo, a search bar, and a user profile. On the left, a sidebar lists various management categories. The main content area is titled 'Attendance/Payroll' and displays a table of staff attendance and payroll data.

**User Profile:**

- Name : Towkay Tan
- ID : C0001
- Age : 43
- Role : CEO

**Table Headers:**

ID	Name	Working Hours	Period	Arrival	Days Leave	Pay per Hr	Net Pay Amt	Bonus	Options
----	------	---------------	--------	---------	------------	------------	-------------	-------	---------

**Table Data:**

E0021	Jennifer	243hrs	Jan 2020	1.2hrs Late	1	14SGD	3402SGD	200SGD	
E0012	Ann	241hrs	Jan 2020	1.5hrs Late	2	16SGD	3856SGD	150SGD	
E0008	Tom	250hrs	Jan 2020	0.5hrs Late	-	20SGD	5000SGD	300SGD	
E0001	Edward	275hrs	Jan 2020	On Time	-	30SGD	8275SGD	500SGD	

**Figure 31: Staff Attendance and Payroll**

The screenshot shows the GetFreshFood application interface. At the top, there is a green header bar with a search bar, user profile, and notification icons. Below the header, the main content area has a title "Employee List". On the left, there is a sidebar titled "Store Management" with a "Profile" tab selected. The profile section displays a photo of a man, his name (Towkay Tan), ID (C0001), Age (43), and Role (CEO). The sidebar also lists other navigation items: Dashboard, Sales and Profit, Attendance/Payroll, Employee List (which is currently selected), and Customer Growth Rates.

ID	Name	Role	Start Date	Phone	Address	E-mail	Options
E0021	Jennifer Hewitt	Promoter	01/01/2008	93244251	Holland	jenniferht@gff.com.sg	
E0012	Ann Holland	Casher	02/02/2008	84561225	Dover	annhd@gff.com.sg	
E0008	Tom Hendrickson	Store Man	05/04/2002	98554622	Red Hill	tomhn@gff.com.sg	
E0001	Edward Cullon	Manger	03/03/2002	99652311	Clementi	edwardcn@gff.com.sg	
C0001	Towkay Tan	CEO	01/01/2008	97852311	Simei	towkaytan@gff.com.sg	

Figure 32: Employee List (CEO view)

## 7.14 Storeman UI

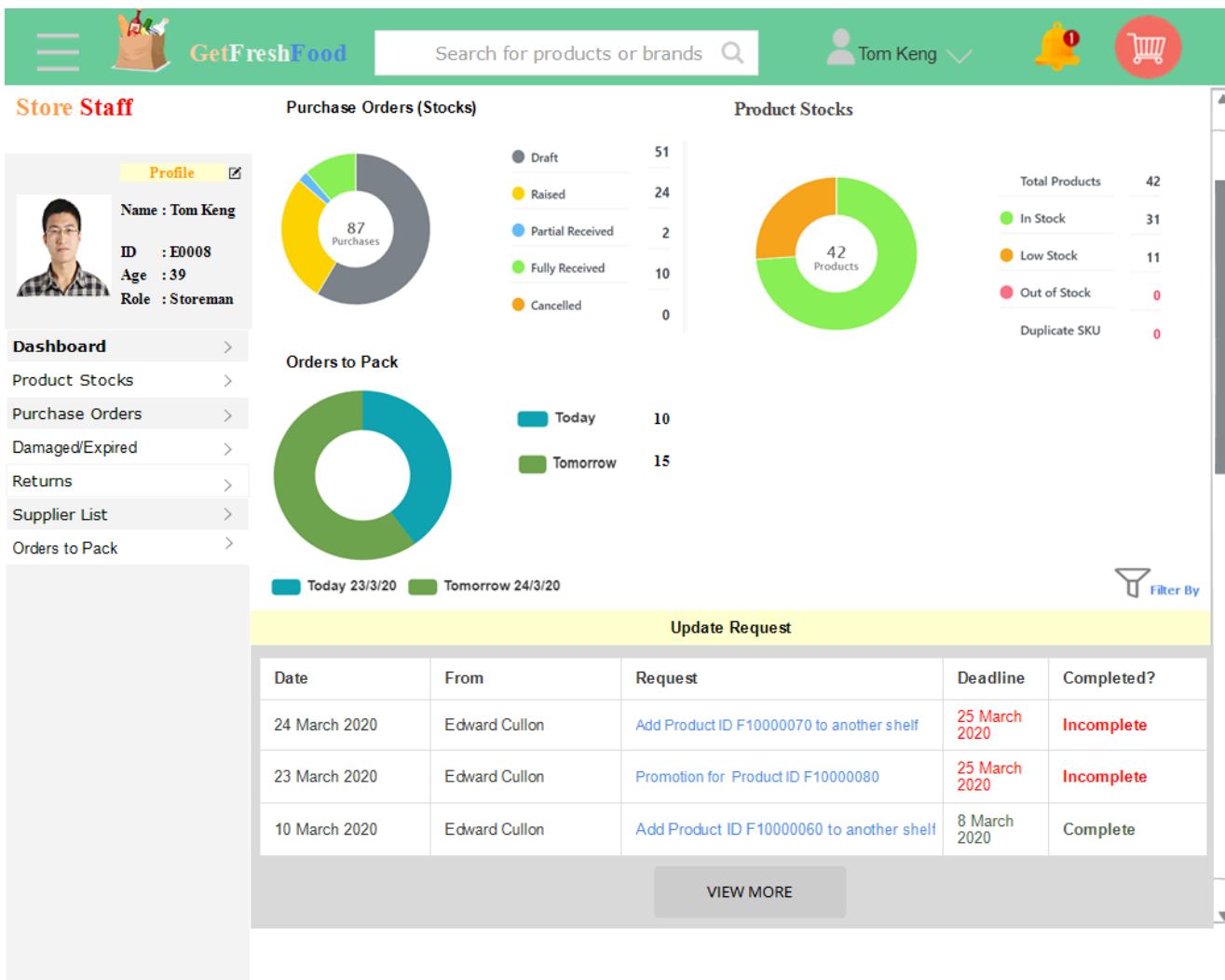


Figure 33: Real Time Updated Dashboard of Storeman

Purchase Orders / New Purchase Order

Import via CSV

Select supplier

#PO0002

Profile

Name : Tom Keng  
ID : ED008  
Age : 39  
Role : Storeman

Dashboard >  
Product Stocks >  
**Purchase Orders >**  
Damaged/Expired >  
Returns >  
Supplier List >  
Orders to Pack >

Item Name      Quantity      Cost per unit      Tax      Total (\$)

Start typing SKU or name...      1      Cost      7      0.00

+ Add another item

Message to Supplier

Total Units	0
Subtotal	\$0.00
Total	\$0.00

CANCEL      SAVE DRAFT      CREATE

Figure 34: Drafting Purchase Orders (PO)

The screenshot shows the GetFreshFood application interface. At the top, there is a green header bar with the logo 'GetFreshFood' and a search bar 'Search for products or brands'. On the right side of the header, there is a user profile icon for 'Tom Keng' and a notification bell icon with a red badge. Below the header, the main content area has a title 'Store Staff' and a sub-section 'Purchase Order / Purchase Order History'. There is a button 'Import via CSV' and a search bar 'Search Purchase Order ID'. A 'Filter By' button with a funnel icon is also present. On the left, there is a sidebar with a 'Profile' section showing a photo of Tom Keng and his details: Name: Tom Keng, ID: ED008, Age: 39, Role: Storeman. Below this, there are several navigation links: Dashboard, Product Stocks, Purchase Orders, Damaged/Expired, Returns, Supplier List, and Orders to Pack. The main content area displays a table of purchase orders:

Purchase Order ID	Status	Date Submitted	Approval by Management
PO0003	Draft	-	Pending
PO0001	Raised	12 March 2020, 2.30pm	Pending

Figure 35: List of PO

The screenshot shows the GetFreshFood application interface. At the top, there is a green header bar with the logo 'GetFreshFood', a search bar 'Search for products or brands', a user profile 'Tom Keng', a notification bell icon with a red dot, and a shopping cart icon.

The main area is titled 'Store Staff' and shows a list of 'Orders to Pack'. On the left, there is a sidebar with a 'Profile' section displaying the user's name (Tom Keng), ID (E0008), age (39), and role (Storeman). Below the sidebar is a navigation menu with links: Dashboard, Product Stocks, Purchase Orders, Damaged/Expired, Returns, Supplier List, and Orders to Pack.

The 'Orders to Pack' section contains a table with the following data:

Date to deliver	Order No	Products Name	Quantity	Additional Info	Deliver To	Packed?
24/3/2020	123456789A	Avocado Mexico	3	Please separate raw meat from fruits.	Tampines Street 43, Blk 399, Unit 10-07, S520399	<input checked="" type="checkbox"/> Yes
24/3/2020	123456089B	Chicken Kampong Malaysia	1		Tampines Street 53, Blk 400, Unit 11-07, S520400	Packed <a href="#">Edit</a>
24/3/2020	123456799C	Organic Fresh Milk (Arla)-Denmark	1	N.A.	Simei Street 12, Blk 111, Unit 08-07, S540111	Packed <a href="#">Edit</a>
		Mushroom Shiitake Malaysia	2	N.A.		

**Figure 36: Orders received from customers for Storeman to pack**

The screenshot shows the 'GetFreshFood' application interface. At the top, there is a navigation bar with a search bar ('Search for products or brands'), a user profile ('Tom Keng'), a notification icon, and a shopping cart icon. The main area is titled 'Damaged/Expired / New Record'. On the left, a sidebar titled 'Store Staff' displays a profile for 'Tom Keng' (ID: E0008, Age: 39, Role: Storeman) and a list of navigation links: Dashboard, Product Stocks, Purchase Orders, Damaged/Expired, Returns, Supplier List, and Orders to Pack. The main form area contains fields for 'Product ID' (with placeholder 'E.g. F10000070'), 'Quantity' (empty input field), 'Reason' (checkboxes for 'Damaged' and 'Expired' - 'Expired' is checked and has a note 'Please state expiry date'), and a section for 'Upload Photo of Damaged/Expired Products' with an 'UPLOAD' button. Below this is a text area for 'Describing where is damaged/expired' (placeholder 'E.g. Pickled Lettuce jar seal was broken.') and a 'SUBMIT' button at the bottom.

Store Staff

GetFreshFood

Search for products or brands

Tom Keng

Profile

Name : Tom Keng  
ID : E0008  
Age : 39  
Role : Storeman

Dashboard >  
Product Stocks >  
Purchase Orders >  
Damaged/Expired >  
Returns >  
Supplier List >  
Orders to Pack >

Damaged/Expired / New Record

+ NEW DAMAGED/EXPIRED

Product ID

E.g. F10000070

Quantity

Reason

Damaged    Expired

Please state expiry date

Upload Photo of Damaged/Expired Products

UPLOAD

E.g. Pickled Lettuce jar seal was broken.

Describing where is damaged/expired

SUBMIT

Figure 37: Damaged/Expired Goods Case Submission to Management

The screenshot shows the GetFreshFood application interface. At the top, there is a navigation bar with a menu icon, a logo of a shopping bag with a thermometer, the text "GetFreshFood", a search bar with placeholder text "Search for products or brands" and a magnifying glass icon, a user profile icon with the name "Tom Keng" and a dropdown arrow, a yellow bell icon with a red notification dot, and a red shopping cart icon.

The main content area has a title "Store Staff" and a sub-section title "Damaged/Expired / History". On the right, there is a button "Import via CSV" and a "Filter By" button with a funnel icon.

On the left, there is a sidebar with a "Profile" tab selected. It displays the user's profile information: Name : Tom Keng, ID : E0008, Age : 39, and Role : Storeman, along with a small profile picture. Below the profile, there is a list of navigation links:

- Dashboard >
- Product Stocks >
- Purchase Orders >
- Damaged/Expired > (This link is highlighted in blue)
- Returns >
- Supplier List >
- Orders to Pack >

The main content area shows a table titled "Damaged/Expired / History" with the following data:

Record ID	Submitted	Product ID	Product Name	Quantity	Damaged/Expired	Checked by Management
R100	18 March 2020, 3.30 pm	F10000070	Picked Lettuce- Bok Cho (Malaysia)	3	Damaged	Pending
R101	17 March 2020, 2.30 pm	F10000550	Potato Chips-Mister (Mexico)	5	Expired	Completed

Figure 38: List of Damaged/Expired Goods Case Submission to Management

The screenshot shows the GetFreshFood application interface. At the top, there is a green header bar with the logo 'GetFreshFood' and a search bar labeled 'Search for products or brands'. Below the header, a navigation bar on the left lists 'Store Staff', 'Supplier List', 'Dashboard', 'Product Stocks', 'Purchase Orders', 'Damaged/Expired', 'Returns', 'Supplier List', and 'Orders to Pack'. The main content area displays a table titled 'Supplier List' with two rows of data. The columns are 'Supplier ID', 'Company Name', 'Company Address', 'Contact Name', 'Phone', and 'Email'. The first row corresponds to MEIJI SEIKA (SINGAPORE) PTE LTD, and the second row corresponds to Malaysia Milk Sdn Bhd.

Supplier ID	Company Name	Company Address	Contact Name	Phone	Email
S12345J	MEIJI SEIKA (SINGAPORE) PTE LTD	36 Quality Rd, Singapore 618806	Sess Maru	65-81556678	sessmaru@meiji.com.sg
S12346H	Malaysia Milk Sdn Bhd	7, Jalan 19/1, Seksyen 19, 46300 Petaling Jaya, Selangor, Malaysia	Ana May	603-7955 4388	anamay@mmsb.com.my

Figure 39: Supplier List

## 7.15 Cashier UI

**GetFreshFood**

Search for products or brands

Ann Holland ✓

**Store Management**

**Profile**

Name : Ann Holland  
ID : E0020  
Age : 43  
Role : Cashier

**Check Out** >

**Refund** >

**Discard Sale** **Proceed**

05:56 PM 03/05/2020 calendar

No	ID	Name	Price	Quantity	Discount %	Discount Price	Gross Price	Net Price	Actions
01	F0100	Apple	2.20	- 05 +	2%	0.22	11.00	10.78	<span>trash</span>
02	F0231	Banana	1.50	- 01 +	-	0.0	1.50	1.50	<span>trash</span>
03	M0002	Chicken 250g	4.80	- 02 +	-	0.0	9.60	9.60	<span>trash</span>
04	M0453	Fish 50g	3.88	- 01 +	-	0.0	3.88	3.88	<span>trash</span>
05	V0043	Watermelon	3.50	- 01 +	-	0.0	3.50	3.50	<span>trash</span>

Card Payment Cash Payment

Total Quantity	10
Gross Amount	29.48
Total Discount	0.22
Net Amount	29.26
Paid	30.00
Change	0.74

Figure 40: Sale Transaction System for Cashier

The screenshot shows the GetFreshFood mobile application interface. At the top, there is a navigation bar with a menu icon, the app logo 'GetFreshFood', a search bar containing 'Search for products or brands', and a user profile 'Ann Holland' with a dropdown arrow.

**Store Management**

**Profile**

Name : Ann Holland  
ID : E0020  
Age : 43  
Role : Cashier

**Check Out**

**Refund**

**End of Day Sale Report**

**Refund**

**Scan**

Product ID: A0001

Product Name: ANN001 FN

Quantity: - 00 +

Date (Bought): 03/05/2020

Description:

03/05/2020

Upload Photo

Request

No	Product ID	Product Name	Quantity	Description	Status
01	F0100	Apple	2	Not Bad	Approved
02	F0231	Banana	1	Not Bad	Reject

**Figure 41: Refund System for Cashier**

## 7.16 Promoter UI

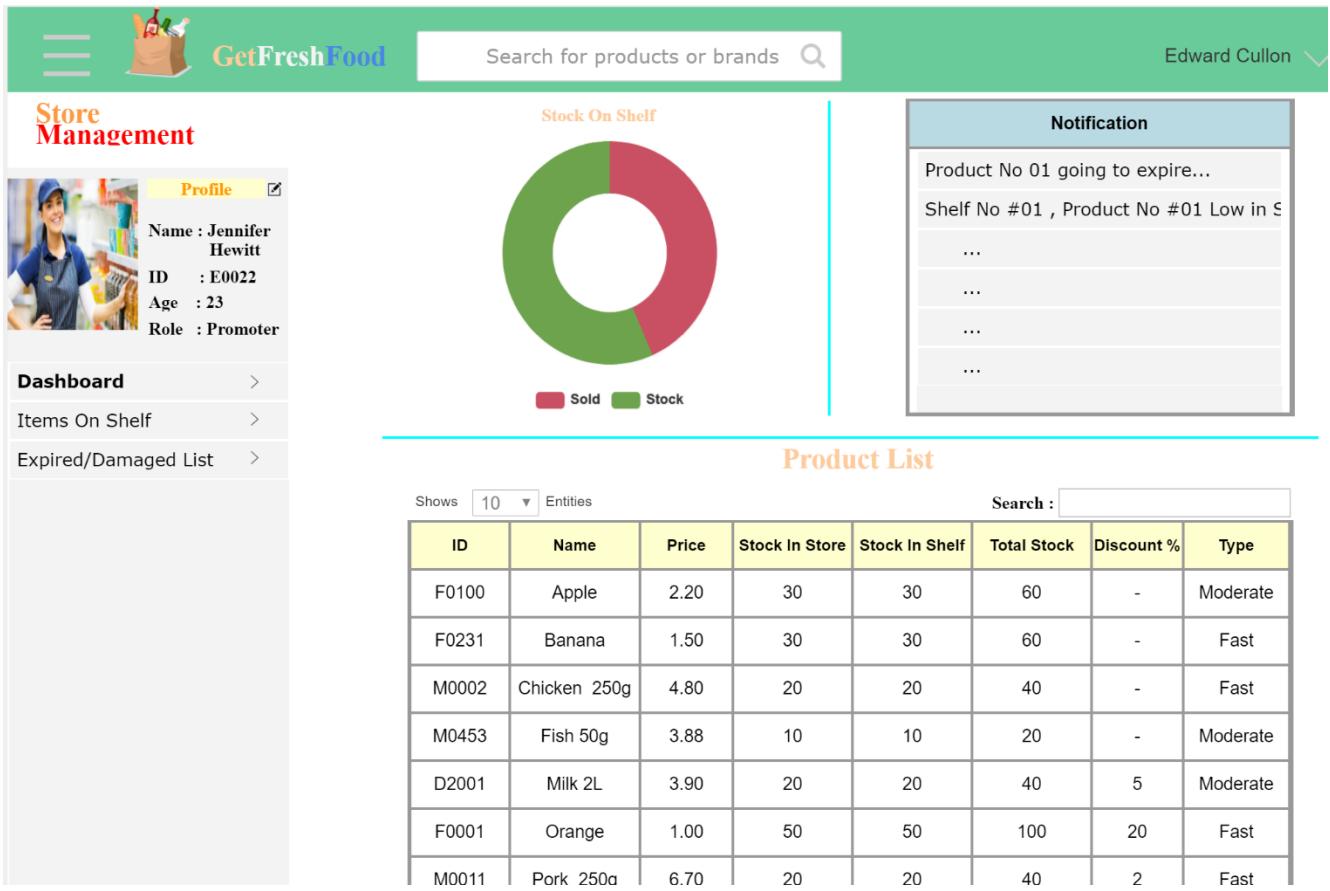


Figure 42: Real Time Updated Dashboard for Promoter

The screenshot shows the 'GetFreshFood' store management application. At the top, there's a navigation bar with a search bar containing 'Search for products or brands' and a magnifying glass icon. To the right of the search bar is a user profile for 'Edward Cullen'. On the left, there's a sidebar titled 'Store Management' with a profile picture of a woman named Jennifer Hewitt and details: ID E0022, Age 23, Role Promoter. Below this are links for 'Dashboard', 'Items On Shelf', and 'Expired/Damaged List'. The main content area has a title 'Add Damaged List' and a form to add a damaged item. It includes fields for Product ID (M0453), Description (empty), Product Name (Chicken 250g), and Quantity (-10+). There are 'Add' and 'Cancel' buttons. Below this is a section titled 'Expired/Damaged List' with a date filter set to 20/03/2020, a search bar, and a table showing a list of items categorized by type (Expired or Damaged).

ID	Name	Price	Expiry Date	Quantity	Shelf No	Type
F0100	Apple	2.20	20/03/2020	10	02	Expired
F0231	Banana	1.50	20/03/2020	10	02	Expired
M0002	Chicken 250g	4.80	22/03/2020	10	01	Damaged
M0453	Fish 50g	3.88	22/03/2020	10	05	Damaged

**Figure 43: Adding Damaged Item & Expired/ Damaged Item List**

The screenshot shows the GetFreshFood Store Management application. At the top, there is a navigation bar with a menu icon, a logo of a shopping bag with groceries, the text "GetFreshFood", a search bar containing "Search for products or brands" with a magnifying glass icon, and a user profile "Edward Cullon" with a dropdown arrow.

**Store Management**

**Stock On Shelf List**

Shows 10 Entities

Search :

Shelf No	Product Name	Price	Stock In Store	Stock In Shelf	Action
01	Apple	2.20	30	2	<a href="#">+</a>
02	Banana	1.50	30	4	<a href="#">+</a>
03	Chicken 250g	4.80	20	6	<a href="#">+</a>
11	Fish 50g	3.88	10	10	<a href="#">+</a>
08	Pork 250g	6.70	20	15	<a href="#">+</a>

Profile [Edit](#)

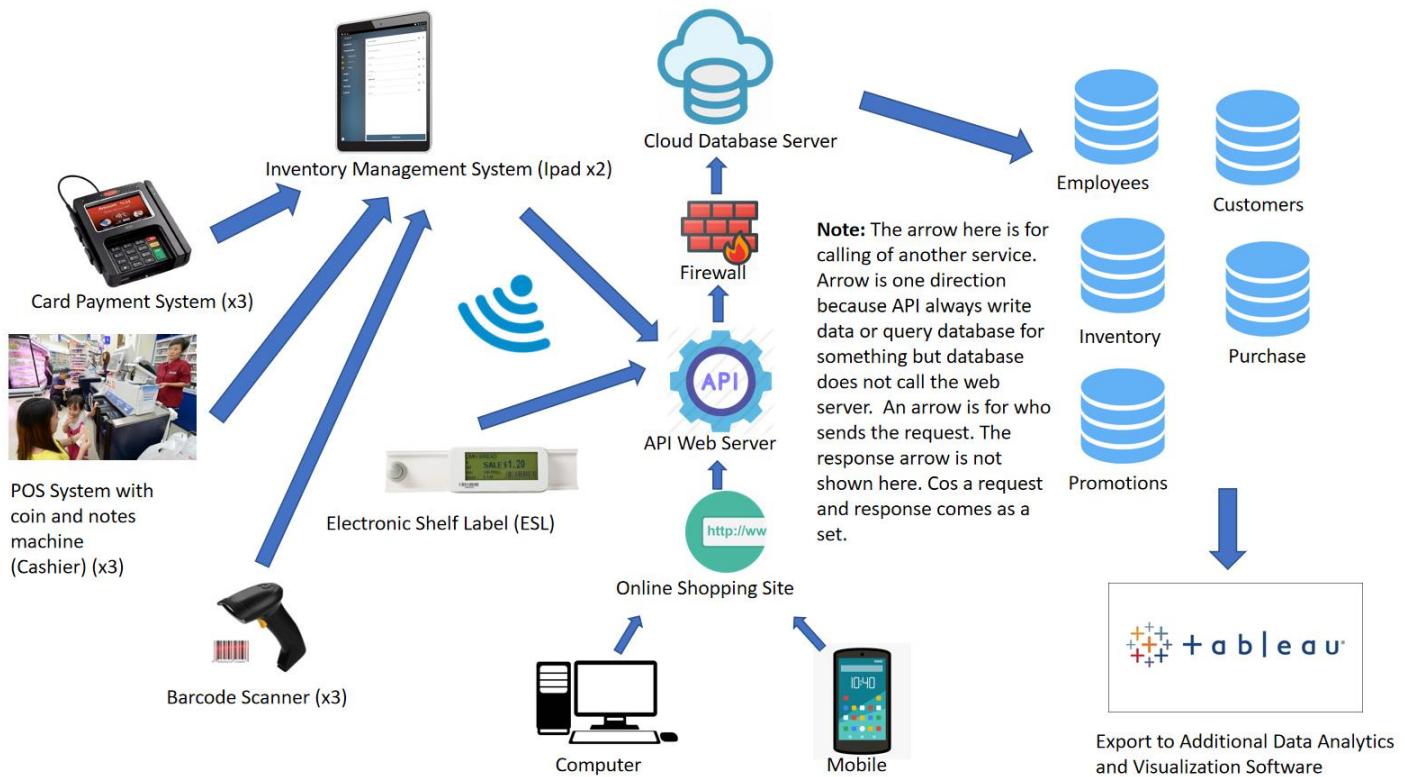
Name : Jennifer Hewitt  
ID : E0022  
Age : 23  
Role : Promoter

[Dashboard](#) >  
[Stock On Shelf List](#) >  
[Expired/Damaged List](#) >

**Figure 44: Current Stocks on Shelves List**

## 8 Non-Functional Requirement

### 8.1 System Architecture



### 8.2 Three-Tier System Architecture and not Two-Tier System Architecture

We will implement a 3-tier system architecture and not a 2-tier system architecture because it is more secure, easier to balance/tune performance and easier to maintain.

#### 8.2.1 Security Layer

Firstly, in our system architecture, we will add the database to be protected behind a firewall and the database will only be called by limited services(gateway) in order to protect the data. Users will be calling directly through the web server as the entry point so that users cannot directly access or hack into the database. This forms a security layer as database access is not granted to anyone but the web server.

### **8.2.2 Performance Scaling and Database Load Reduction**

In this way, the system architecture is also more maintainable and scalable as we can always do performance balancing and tuning on the web server instead of database. This is extremely important when we have tons of users, because if users were to call directly to the database (2 tier architecture), the database will become very laggy. With 3 tier architecture, it is easier to scale performance because the web server does not contain data and even if there are a lot of web servers, it is a stateless server. There is database load reduction since the web server can cache the data it retrieved from the database, saving space.

### **8.2.3 System Maintenance**

In terms of maintenance, we also avoid the costly and tedious complexity of user/role maintenance on the database side. User/role maintenance can be done on the application layer which is the web server Application Programming Interface (API). For 3 tier architecture, there is database connection pooling where a web service can utilize a small pool of permanently opened database connections which is beneficial compared to database connection pool being limited on the database server side. Opening a new database connection is very expensive and hogs up a lot of bandwidth (especially to the database server).

Therefore, we are not using 2 tier architecture but instead, 3 tier architecture to separate the data layer from the application logic layer. All incoming requests will communicate with the application logic layer first.

## **8.3 Cloud Computing Server and not On-premise Dedicated Hardware Server**

We weighed the pros and cons between cloud computing server and on-premise dedicated hardware server and decided to pick cloud computing server for the system architecture with consideration to the GetFreshFood's situation and challenges. We will justify them in terms of performance, security and reliability. Overall, cloud server is cost efficient and more viable as you pay for a comprehensive package of performance, security and reliability.

### **8.3.1 What is Cloud computing and On-Premise Dedicated Server**

Cloud computing as defined by the National Institute of Standards and Technology (NIST),

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is "a model allowing common and convenient on-demand network access to a shared pool of configurable computing resources such as applications, networks, servers, services and servers that can be rapidly provisioned and released with minimal management effort or service provider interaction." (Mell & Grance, 2011).

An on-premise dedicated server is a physical that is rented or bought entirely for the own store's business needs. These servers are commonly used by large organizations that have the budget to afford and configure for extremely high levels of server capacity and data security (Rackspace,2020).

### **8.3.2 System Performance**

Cloud servers have quickly scalability, they can quickly scale up individual micro services which make up our digital solution system and adjust to operations even with sudden steep spike of traffic involving concurrent users. However, for on-premise servers, time is needed to upgrade and purchase more hardware components to scale performance.

### **8.3.3 Security Requirements**

Cloud computing servers are maintained by cybersecurity and technology experts that backup your data securely and regularly.

However, for on-premise dedicated server, an IT expert team is required to produce and maintain similar results. Considering GetFreshFood's manpower size, the time and the budget needed to form an IT expert team, it is very expensive to hire and time consuming to stabilize such a team therefore cloud servers best fit GetFreshFood's business situation.

## **8.4 Reliability Requirements**

### **8.4.1 Operation Time**

The physical store operates everyday of the week from 7am to 10pm. With the implementation of the online store system, customers have the flexibility and convenience to order anytime and anywhere.

### **8.4.2 Hardware Failure**

There is no hardware failure because the system will be on cloud servers.

#### **8.4.3 Disaster Recovery**

Cloud servers have their own disaster recovery. There is no server failure or downtime since cloud servers always have mirror servers, meaning, there are always many other servers that serve as instant backup to fulfil the role of the primary server should it fail or crash. These beats having on-premise server that can have these issues because it is expensive to invest in multiple servers. Customers also lose patience and interest if the site frequently crashes, decreasing the store's profits.

#### **8.4.4 Cost**

With cloud servers, they only charge based on the usage, which is cheaper than investing one lump sum to purchase a hardware server and still pay fixed maintenance fees regardless of the usage.

### **8.5 Cloud Audit and Compliance**

As quoted from InfoQ (2020), "IT security audits determine whether an IT system and its maintainers fulfil both the legal expectations of customer data protection and the company's standards of achieving financial success against various security threats".

There are several different cloud security and compliance requirements that cloud service provider like Amazon Web Services (AWS) or Microsoft Azure must comply with since it involves sensitive and critical information being maintained and stored. Fortunately, modern and well-known cloud service providers like AWS or Azure make it simple and easy to comply with the requirements of auditors by helping its users fulfil the security criteria, frameworks and certifications (Finney,2020).

For example, AWS has customizable and dynamic compliance checkers for cloud resources like the Inspector by Amazon, which uses security assessment tool automation to detect any security and compliance issues for applications (Yosr et al,2020).

## 8.6 Volume Tables

The following tables describe the volume specifications for different operations.

### 8.6.1 User Volume Table

User Group	Country/Location/Country	Remark
Branch Manager	Singapore/Junction 8 Mall /1	The Branch Manager needs to use the system every day. He usually works at the office.
Storeman	Singapore/Junction 8 Mall /4	The Storeman needs to use the system every day. He is often stationed at the storage/warehouse and sometimes needs to access the system at the store.
Cashier	Singapore/Junction 8 Mall /6	The Cashier needs to use the system daily and is stationed at the cash counter.
Promoter	Singapore/Junction 8 Mall /20	The Promoter sometimes needs to access the system to perform their tasks.
Customer	Singapore/Any/Any	The Customer needs to order the products anytime and anywhere through an online shopping system and sometimes goes to the store directly.

### 8.6.2 Business Transaction Volume Table

Biz Transaction (Use Case)	Business Critically	No of User	Transaction Information	Concurrent important Activities
Branch Manager				
Manager views Customer Feedback	Moderate	1	Once a day	
Manager updates Electronic Shelf Tag	Moderate	1	twice a day	
Notify Manager about pending purchase orders	Moderate	1	once a day	
Notify Manager low stock levels in warehouse	Moderate	1	every 1-2 days	
Manager creates new employees	Low	1	5 times per month	
Manager prints report	Low	1	once a day	
Manager decides Refund/Exchange Cases	Moderate	1	3 times a day	
Manager maintains Supplier Records	Moderate	1	5 times a week	
Manager edits Employee Records	Moderate	1	once a day	
Manager exports reports	Critical	1	6 times per day	
Storeman				

<b>Storeman generates Purchase Order Form</b>	Critical	4	Twice a shift	
<b>Storeman returns damaged or expired goods to suppliers</b>	Moderate	4	every 3 days	
<b>Storeman packs online Orders</b>	Critical	4	peak: 35 times a shift non peak: 15 times a shift	
<b>Storeman maintains Inventory record</b>	Critical	4	peak: 30 times a shift non peak: 10 times a shift	
<b>Notify Storeman cancelled orders</b>	Moderate	4	5 times a shift	
<b>Notify Storeman upcoming online order</b>	Critical	4	peak: 70 time a day non peak: 30 times a day	
<b>Notify Storeman low stock levels in warehouse</b>	Moderate	4	twice a day	
<b>Notify Storeman list of products going to expire</b>	Low	4	5 times a week	
<b>Notify Storeman about new suppliers</b>	Low	4	4 times a week	
Customer				

<b>Customer login to GetFreshFood Account</b>	Critical	400 0	300 per day	150 customers per hour
<b>Customer manages GetFreshFood Account</b>	Moderate	200 0	20 times per year per customer	
<b>Customer adds products to cart</b>	Critical	400 0	300 per day	180 customers per hour
<b>Customer checks out cart</b>	Critical	400 0	200 per day	80 customers per hour
<b>Customer manages delivery details</b>	Moderate	100 0	50 per day	20 customers per hour
<b>Customer tracks order status</b>	Moderate	200 0	100 per day	40 customers per hour
<b>Customer requests refund/exchange</b>	Low	800	20 per day	
<b>Customer cancels orders</b>	Moderate	100 0	80 per day	
<b>Customer retrieves location of item in physical store</b>	Low	800	30 per day	
<b>Customer submits feedback form</b>	Low	100 0	10 per day	

<b>Notify Customer new promotion</b>	Moderate	100 0	Send email every Wednesday, 1000 per week	
<b>Notify Customer upcoming delivery</b>	Moderate	500	200 per day	
<b>Customers resets password</b>	Moderate	200 0	5 times per year per customer	
<b>Customers creates new account</b>	Critical	300 0	80 per day	
<b>Customers manages credit card account</b>	Moderate	100 0	50 per day	20 customers per hour
<b>Cashier</b>				
<b>Cashier checks out physical shopping basket</b>	Critical	6	peak: 100 times per cashier per day non-peak: 60 times per cashier per day	
<b>Cashier proceeds refund/exchange at store</b>	Moderate	6	10 times per shift	
<b>Promoter</b>				
<b>Promoter view Product Classification</b>	Critical	20	40 times per shift	
<b>Notify promoter about low stock levels at the shelves</b>	Critical	20	30 times per shift	

<b>Notify lists of products going to expire</b>	Moderate	20	10 times per shift	
<b>Promoter updates shelf stock</b>	Critical	20	25 times per shift	
All Staff				
<b>All staff tap in/tap out work attendance</b>	Critical	31	70 times per day	
<b>Notify all staff about promotion and price changes</b>	Moderate	31	31 times a day	
Scheduler				
<b>Generate Loss-of-sale report and send email to manager</b>	Low	1	8 times per month	
<b>Classify products in order to add to Product Categories</b>	Moderate	1	once or twice a week	
All user				
<b>Print price label for food items that need to be weighed</b>	Moderate	300 0	500 times a day	

### 8.6.3 Data Transaction Volume Table

Business Entity Class	Source Document	Retention Period	Target Volume
Customers	Customers Detail Record	7 years	100 customers per day 36,500 customers per year

<b>Inventory Stock Details</b>	Inventory Form	7 years	1600 products per day 584,000 product per year
<b>Product Details</b>	Product Details Record	3 years	2000 products per day 730,000 products per year
<b>Product Categories</b>	Product Categories Record	3 years	2000 products per day 730,000 products per year
<b>Expired and Damaged Product Details</b>	Expired and Damaged Product Record	6 months	50 records per month
<b>Transaction Details</b>	Transaction Details	3 years	300 transactions per day 109,500 transactions per year
<b>Sale Transaction</b>	Sale Transaction Details	3 years	200 transactions per day 73,000 transaction per year
<b>Suppliers Details</b>	Suppliers Form	7 years	300 customers per month
<b>Customer Feedback</b>	Customer Feedback Record	1 year	20 records per month 240 records per year
<b>Shelves Display Details</b>	Shelves Display Details	1 year	300 records per day
<b>Going to expire product list</b>	Going to expire product list	6 months	50 records per month 300 record 6 months
<b>Employees Records</b>	Employees Details Record	5 years	10 staffs per month 50 staffs per year

<b>Online Orders Details</b>	Online Orders Details Record	3 years	50 orders per day 1500 orders per month
<b>Refund/Exchange List</b>	Refund/Exchange Details	3 year	20 records per month 240 records per year
<b>End-of-day Sales Records</b>	End-of-day Sales Report	1 year	once a day 365 times per year
<b>Loss-of-sale Report</b>	Loss-of-Sale Report	3 year	8 times a month
<b>Purchase Order</b>	Purchase Order Form	3 year	300 transactions per day 109,500 transactions per year
<b>Attendance Time Records</b>	Attendance Report	1 year	70 times a day 25,550 times per year
<b>Cart</b>	Cart Details	1 month	300 records per day 109,500 records per year

#### 8.6.4 System Security Requirement (*From Data Point of View*)

Data (Entity)	Actor					
	Customer	Branch Manager	Storeman	Cashier	Promoter	CEO
<b>Customers Record</b>	C,U,R,D	R				
<b>Inventory Stock Details</b>		C,U,R,D	C,U,R	R	R	R
<b>Product Details</b>	R	C,U,R,D	R	R	R	R

<b>Product Sales Classification</b>		C,U,R,D	R	R	R	R
<b>Transaction Details</b>		R	R	U		R
<b>Sale Transaction</b>		U,R	R	C,U,R,D		
<b>Suppliers Details</b>		C,U,R,D	R			
<b>Customer Feedback</b>	C,U,R,D	U,R,D				U,R,D
<b>Shelves Display Details</b>	R	C,U,R,D			C,U,R,D	
<b>Clearance List</b>	R	C,U,R,D	C,U,R		C,U,R	
<b>Employees Records</b>		C,U,R,D	R	R	R	C,U,R,D
<b>Online Orders Details</b>	C,U,R,D	R	U,R			
<b>Refund/Exchange List(For Customers)</b>	C,U,R,D	U,R	R	C,U,R	R	
<b>Sales Records</b>		R		R		R
<b>Loss-of-sale Report</b>		C,R,U,D				R
<b>Purchase</b>		U,R,D	C,U,R,D			

Order						
Attendance Time Records		C,R,U	R	R	R	C,U,R,D
Cart	C,U,R,D	U,R,D	R			

#### 8.6.5 System Security Requirement (*From Use Case Point of View*)

Use Case	Actor					
	Customer	Branch Manager	Storeman	Cashier	Promoter	CEO
View Customer Feedback	x	x				x
Update Electronic Shelf Tag		x			x	
Notify about pending purchase orders		x				
Notify low stock levels in warehouse		x	x			
Maintain employee records		x				x
Views reports		x				x
Reviews Refund/Exchange Cases		x				
Maintains Supplier Records		x				
Approve Purchase Order request		x				
Create a new employee		x				x
View Monthly Profit report		x				x
Update Attendance Time Records		x				x
Generates Purchase Order Form			x			

Returns damaged or expired goods to suppliers			x			
Packs online Orders			x			
Maintains Inventory record			x			
Notify cancelled orders			x			
Notify upcoming online order			x			
Notify list of products going to expire			x		x	
Notify about new suppliers		x	x			
Notify list of expired products to remove			x		x	
Login to GetFreshFood Account	x	x	x	x	x	x
Manage personal customer details	x					
Add products to cart	x					
Check out cart	x					
Manage delivery details	x					
Track order status	x					
Request refund/exchange	x					
Cancel orders	x					
Retrieves location of item in physical store	x	x	x	x	x	x
Submits feedback form	x					
Notify Customer new promotion	x					
Notify Customer upcoming delivery	x					
Reset password	x	x	x	x	x	x
Customers creates new	x					

account						
Manage credit card account	x					
Check out physical shopping basket				x		
Proceed refund/exchange at store				x		
View Product Sales Classification		x	x		x	x
Notify promoter about low stock levels at the shelves					x	
Update shelf stock					x	
Tap in/tap out work attendance		x	x	x	x	
Notify all staff about promotion and price changes		x	x	x	x	x
Print price label for food items that need to be weighed	x	x	x	x	x	x

## 9 Conclusion

The automation incorporated from the system architecture in various stages of the operations greatly improves working efficiency and decision making. The discrepancies in sales and inventory is handled by automatic coin and notes system, barcode scanners and electronic shelf labels to eliminate cash and product price errors. Incorporating online shopping platform will reduce queues at physical store and open a new source of revenue and customer acquisition. Customers can easily browse, plan and track their orders anywhere. This enhances their shopping experience and therefore increases customer retention rates. Overall, motivation of staff will improve since workload is reduced with technology assisting them to carry out duties accurately and customers will also feel happy with the convenience of the shopping platform and simplicity of the automated work processes.

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## 10 References

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