

Digital Transformation for GetFreshFood

User Requirement Specification Report

SA52 Team 2

Whitestar Computing

Authors

Name	Student ID
Fun Weng Lup, Ronnie	A0230477E
Aye Phyu Sin	A0230446M
Changying Shao	A0230469A
Willard Toh Hui Kian	A0226755X
Chen Wenquan	A0230451W
Chia Yan Long, Brandon	A0097266R
Hou Lu Chiok Weh Alejandro	A0230492L
Zhao Qi	A0230464M

Abbreviations

UI	User Interface
RFID	Radio Frequency of Identification
IOT	Internet of Things
POS	Point of Sale
ID	Identification
UPC	Universal Product Code
SKU	Stock-Keeping Unit
CEO	Chief Executive Officer
PO	Purchase Order
C, R, U, D	Create, Retrieve, Update, Delete

Contents

1. Introduction.....	1
1.1 Background Information	1
1.2 Purpose of Report.....	1
2. Overview of Scope.....	2
2.1 In Scope of System.....	2
2.1.1 Implementation of an Internet of Things Solution	2
2.1.2 E-Portal.....	3
2.2 Out of Scope of System.....	3
2.2.1 Artificial Intelligence.....	4
3. Personas and Journey Map.....	5
3.1 Store Man's Persona.....	5
3.2 Store Man's Journey Map	6
3.3 Branch Manager's Persona.....	6
3.4 Branch Manager's Journey Map	7
4. User Stories.....	8
4.1 Store Man's User Stories.....	8
4.2 Branch Manager's User Stories.....	9
5. System Use Case Diagram and Domain Model	10
5.1 Use Case Diagram.....	10
5.2 Domain Model.....	11
5.3 Domain Model Description.....	11
6. Functional Requirement.....	13
6.1 Activity Diagrams and Class Diagrams	13
6.1.1 Branch Manager	13
6.1.2 Store Man	14
6.1.3 Store Man & Promoter	15
6.1.4 Cashier	15
6.1.5 Promoter	16
6.1.6 Customer.....	16
6.2 Screen/Print-Out Design	17
6.2.1 Customer's Desktop and Mobile UI.....	17
6.2.2 Employee's Desktop UI.....	31
7. Non-Functional Requirement	44

7.1 System Architectures.....	44
7.1.1 Security Advantages of Three-Tier Architecture	44
7.2 System Performance Requirements	45
7.3 System Volume Requirements	45
7.3.1 User Volume Table.....	45
7.3.2 Business Transaction Volume Table	46
7.3.3 Data Transaction Volume Table.....	52
7.4 System Security Requirement (From Data Point of View).....	56
7.5 System Security Requirement (From Use Case Point of View)	57
7.6 Reliability Requirements.....	61
7.6.1 Operation Time.....	61
7.6.2 Hardware Failure	62
7.6.3 Disaster Recovery.....	62
8. References.....	63

1. Introduction

1.1 Background Information

GetFreshFood is a medium-sized supermarket chain in Singapore, with 6 outlets located all around Singapore. There are four main job functions in the supermarket, namely the branch manager, store man, promoter, and cashier. All 6 outlets can be assumed to function in the same manner.

GetFreshFood has very a traditional operating method, with all its operations, such as the updating of inventory levels and product price, being manual in nature. Due to the manual nature of its operations, GetFreshFood frequently runs into situations where there are mistakes and discrepancies, especially in the sales and inventory records.

GetFreshFood currently only has physical outlets and would also like to look into providing an online ordering service.

The primary purpose of this digital transformation is to remove the occurrences of mistakes and discrepancies in their records as well as to increase sales by having an online presence.

1.2 Purpose of Report

This report documents the scope of the system to be built for GetFreshFood, our understanding of the people who will be using the system, and the specific details of the system, such as its features, UI designs, and key requirements.

2. Overview of Scope

2.1 In Scope of System

Here we will discuss the new system with its accompanying technologies and features. Our main goal when designing the system is to eliminate, and in areas where elimination is impossible, severely reduce human errors within the business processes. We also aimed to improve some of the current business processes with the implementation of technology.

2.1.1 Implementation of an Internet of Things Solution

An Internet of Things (IOT) Solution enables inventory to be tracked effectively and in real-time, allowing business processes to flow smoothly.

2.1.1.1 RFID Tags

By having inventory tagged with RFID tags, sensors would be able to pick up on the location of the individual RFID tags that are unique to each other. The uses of these RFID tags will be further discussed in detail below.

2.1.1.2 Smart Doors

By having RFID sensors on the doors within the building, the location of inventory can be accurately tracked to ensure that the goods are not lost in transition without records.

2.1.1.3 Smart Shelves

Smart Shelves allow the inventory on the shelves (both at the store front and storeroom) to be monitored continuously in real time using RFID sensors. Not only does this reduce the manpower required to count the products, our system also helps to trigger the store man and promoter when the shelves are running low, ensuring the shelves are always well stocked.

2.1.1.4 Electronic Price Tags

Electronic price tagging on the shelves will allow instantaneous updates to the products, prices, and discounts displayed on the shelves without physical replacement of the tags. This aims to reduce the human error of missing out the changing of a price label, and to quicken the process of any product details changes.

2.1.1.5 IOT Point of Sale Counter

An IOT integrated POS counter will help customers by creating a smooth and quick checkout process. This reduces customer waiting time and gives the customer a more pleasant shopping experience, encouraging the customers to come back more often. There are 2 ways that the customer can check out their selected products.

- **Self-Checkout**

The self-checkout counter will have RFID Sensors to detect the items the customers have in their basket, and automatically calculate the price in real time based on what is

stored in the database. This eliminates any human error in scanning SKUs or missing out any items.

At the backend, the POS counter will also update the database on which products have been bought, thereby reconciling inventory levels and items purchased.

- **Cashier Assisted Checkouts**

For customer with larger orders or facing problems with the self-checkout, the cashier assisted checkouts are also available to them. Cashier assisted checkouts are virtually identical but have a different form factor to allow items to be checked one by one.

2.1.1.6 Security Sensors (RFID)

Security sensors armed with RFID scanners at the entrances and the exits of the building will prevent any unauthorized removal of products from the store.

2.1.2 E-Portal

Development of an E-Portal aims to eliminate manual paperwork within the current processes so that errors such as physical paperwork missing will be avoided. The E-Portal will be connected to the database which is updated in real-time using the RFID technology as described above.

2.1.2.1 Employee Portals and Dashboards

All employees will be given restricted access to the information they require through the e-portal. Furthermore, requests relating to their normal work functions can be made through the portal. This improves traceability in the business processes.

Reports and dashboards can be accessed anytime throughout the day and daily reports no longer need to be manually generated.

2.1.2.2 Online Shopping and Delivery Service

The system is integrated with an online Customer Shopping Portal coupled with a delivery service which allows customer to shop online. This provides convenience to customers and might reduce overheads by having smaller storefronts if more customers prefer to shop online in the future.

2.1.2.3 Cloud Based Server Architecture

The implementation of the database and the software process will be on the cloud. The cloud allows the system to be scalable, more cost effective, and more secure.

2.2 Out of Scope of System

The solution discussed above has been designed to tackle some of the various issues the company is currently experiencing. Notwithstanding, the system may be expanded to include more features if the situation calls for it.

2.2.1 Artificial Intelligence

2.2.1.1 Smart Cameras

Smart cameras linked to artificial intelligence will be able to track more than product movement within the building. Employees and customer movement can be further tracked. This can help in the security of the store.

2.2.1.2 Data Analytics

With RFID tagging and sensors, and possibly the use of smart cameras, tons of data will be collected. These data can be reviewed using artificial intelligence to possibly optimize the processes. These optimizations can be done in the form of, but not limited to, more efficient layout of the warehouse, better placement of the shelves at the store, and even how the products are displayed on the shelves.

3. Personas and Journey Map

This component of the report encapsulates the present situation in the shift-to-shift operations as seen from the perspective of the staff working under GetFreshFood. Within the supermarket, daily interactions between the different roles bring about tension and causes problems in the operational flow within the business. The personas and journey maps are designed for the purpose of facilitating our understanding towards these prospective users' patterns of behavior, experiences, goal orientations and their needs before implementing a system to alleviate their problems.

A persona can be conceptualized as a character profile of a certain staff with a particular role. This staff member's persona is used as representation of all staff with a similar role that addresses their mutual frustrations, their motivations for using our system (tagged as "influencers"), and their desires and expectations from using our product (tagged as "primary use").

A journey map outlines the activities of a prospective user's work, as well as their associated feelings and experiences they may feel throughout their shift. The final row entails what they expect from the system.

3.1 Store Man's Persona

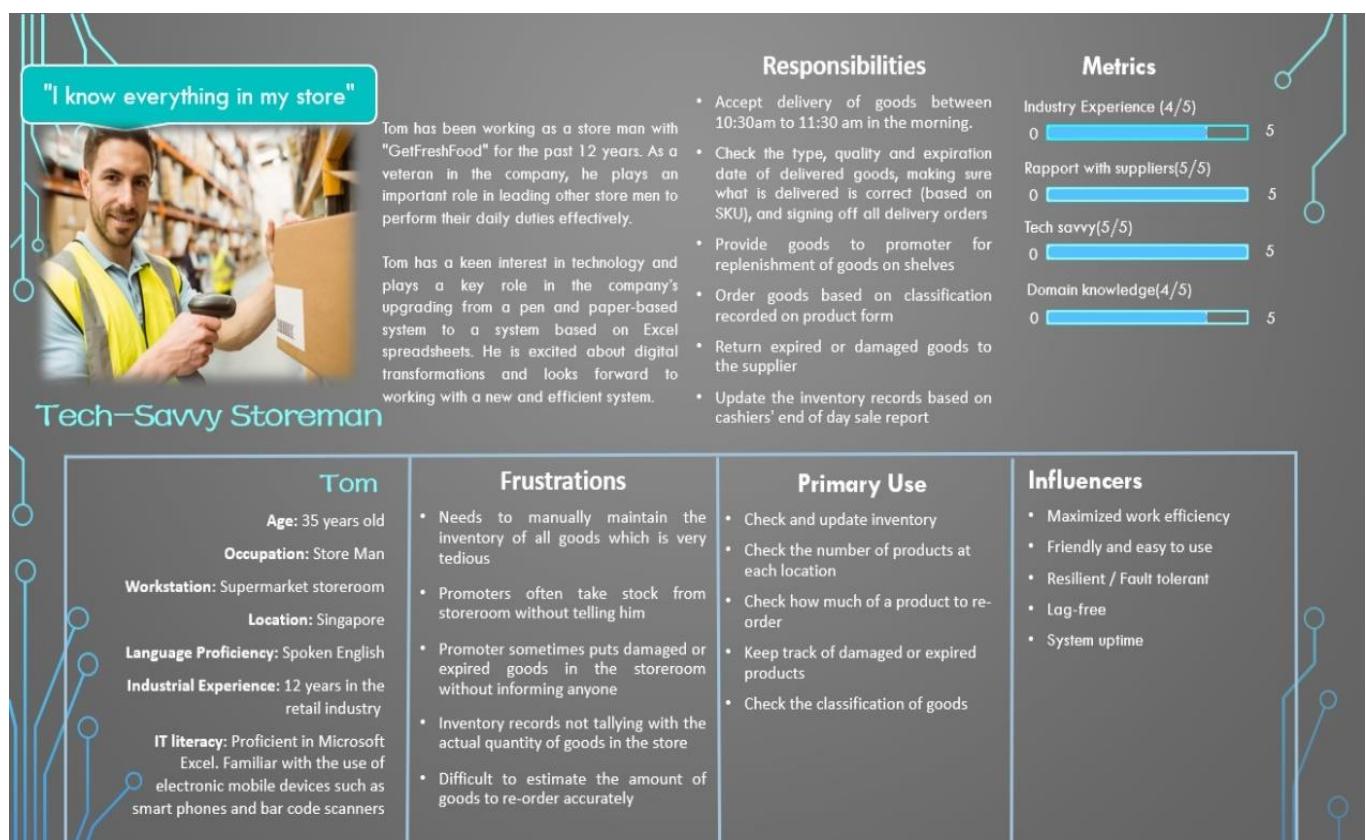


Figure 3-1 Store Man's Persona

3.2 Store Man's Journey Map

Table 3-1 Store Man's Journey Map

Stages of Journey	Attending Briefing	Providing stock to promoter	Delivery and return of goods				Placing Order		
Activities	Receive instructions on what products needs to be replenished	Provide stock to promoter to replenish shelves	Maintain inventory of all goods manually	Accept delivery of goods	Check the storeroom for damaged and expired goods	Return damaged or expired goods to supplier	Decide on the quantity to order	Place order with supplier	Update the inventory records based on cashier end-of-day record
Feelings									
Experiences	Happy to get the quantity of goods to replenish	Satisfied when the promoters follow the proper procedure to get the items. However, it is upsetting when promoters take the items on their own	Tiring to maintain the inventory due to the large number of products.	Exhausting to check the quality and quantity of goods, verify SKUs and sign delivery order.	Unhappy when he notices unaccounted goods lying on the platform of his storeroom.	Unhappy with the tedious process of filling in physical triplicate forms.	Satisfied with the current process of checking for stock and categorizing products to place orders.	Happy due to good relationships with all the suppliers.	Tedious to manually update the inventory records. Unhappy to spend hours every month doing reconciliation
Expectations	A way to receive quantity of goods to order through system	Should have oversight of all movement of the products out of the storeroom.	Should have digitalized system to maintain the inventory	Should have a computerized system to check on quantity of goods	Promoters must inform him through the system of expired or damaged goods	Be able to automate the administrative portion of the return of goods	Be able to check the classification of the products through the system.	A system to record all suppliers' information	System to automatically update inventory status in real-time. System to detect cashing errors like double scanning or missing out scanning an item.

3.3 Branch Manager's Persona

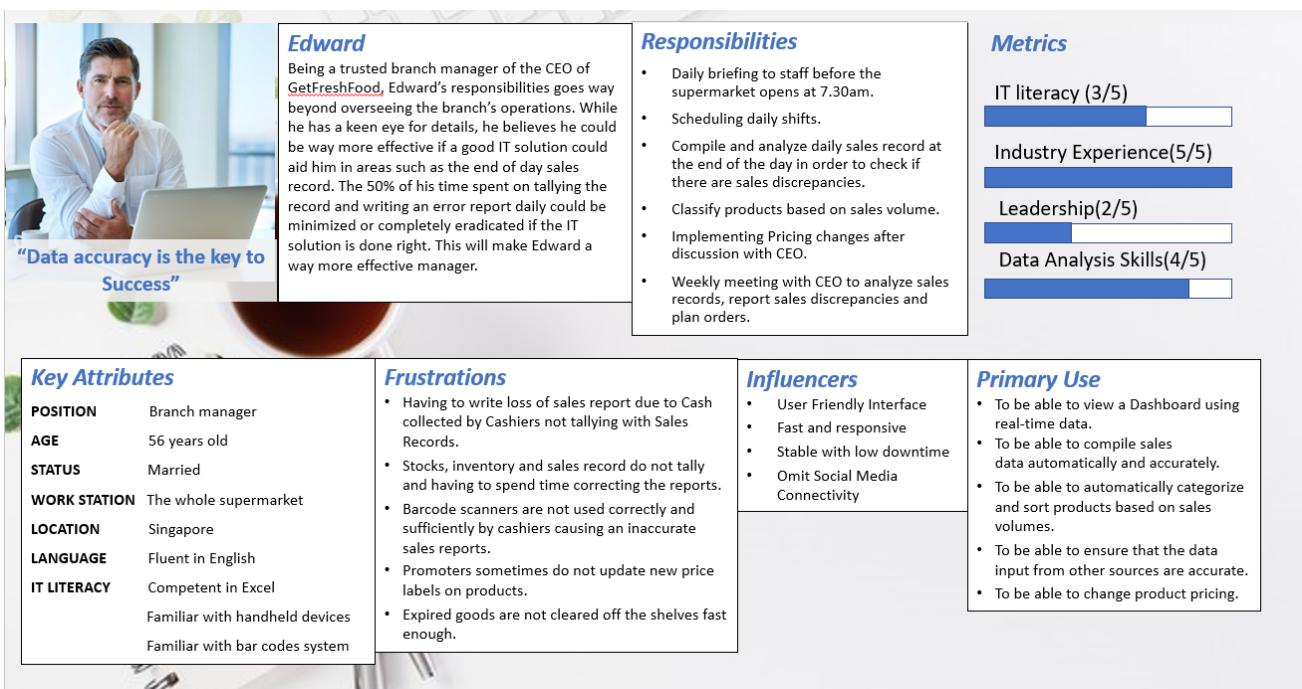


Figure 3-2 Branch Manager's Persona

3.4 Branch Manager's Journey Map

Table 3-2 Branch Manager's Journey Map

Stages of Journey		Morning Routine				Evening Routine		
Activities	Daily briefing with all the staff 	Schedule staff shifts for the next day 	Classify products and transfer it to the spread sheet 	Change Product prices in the product form 	Supervise the store front before shutting down 	Tally end of day sales record 	Evaluate how well goods are sold 	Write loss-of sales report to be sent to CEO weekly 
Feelings	Annoyed with the need to remind staff of potential errors made.	Happy because it's the easiest task and non-stressful.	Tedious to manually classify each product based daily sales records which often have errors.	Frustrated that product prices are not updated on the store front by the promoters.	Happy that it is end of the opening hours. But not looking forward to doing reports.	Very frustrated that 50% of his time daily is wasted on rectifying discrepancies.	Frustrated that the records are not accurate when doing evaluation.	Very frustrated to inform the CEO of loss-of-sales because sales discrepancies could not be solved.
Experiences	Staff be able to minimize mistakes.	Easily accessible staff information to speed up the process.	A system able to recommend categories for the products based on sales volumes.	A system able to automatically change the prices on the product shelves.	Staff able to close the store without supervision.	A system that can improve the workflow to eradicate manual work.	A system that could filter and rank sales.	A solution to automate recording of sales and immediately notify CEO when problems occur.
Expectations								

4. User Stories

User stories outline all the needs and wants of a prospective user of our system based on their input during the interview process and their reasons for wanting these implementations into the system. The intent of a user story is to capture potential requirements that may be embedded into our system in order to rectify the problems faced by these prospective users during their work process.

4.1 Store Man's User Stories

Table 4-1 Store Man's User Stories

Persona information	User story
Get instructions on goods to buy from branch manager	As a store man, I would like to retrieve the list of goods to order from the branch manager through the system so I don't have to read the physical product forms or wait for him to pass me the physical product forms before I can place the orders.
Check classification of goods	As a store man, I would like to get the classification of goods from the branch manager through the system so that I don't have to wait for him to pass me the product forms.
Accepting delivery of goods	As a store man, I would like to receive an automated notification to collect delivered goods from my supplier when they have reached GetFreshFood so that I don't have to wait for them.
Provide stock to promoter to replenish shelves	As a store man, I would like to get notified when the remaining balance of an item on the shelves hits a pre-set amount so that I can transfer the items from the storeroom to the promoters/shelves.
Maintain inventory of goods	As a store man, I would like to view real-time data of the inventory so that I can keep track of the inventory levels. As a store man I would like to update the inventory amount so that I can correct any discrepancies found.
Returning goods	As a store man, I would like to retrieve supplier contact details from the system so that I don't need to check the details from my black book.
Promoters sometimes take or return products from	As a store man, I would like to view and verify the list of goods to be returned (updated by promoters)

storeroom without informing him	so that identifying and recording return goods would be more efficient.
	As a store man, I would like to receive notification whenever goods are moved into or out of the storeroom (category, quantity, reasons) so that I am aware of what is happening to the goods in the storeroom.
Returning goods	As a store man, I would like to retrieve supplier contact details from the system so that I don't need to check the details from my black book.

4.2 Branch Manager's User Stories

Table 4-2 Branch Manager's User Stories

Persona information	User story
Classify products	As a branch manager, I would like to view a weekly sales report so that I am able to know the store weekly performance.
Check classification of goods	As a branch manager, I would like to sort all products by the sales volume so that I can more easily categorize the products.
Tally end of day sales report	As a branch manager, I would like to view the end of day sales report so that I can tally the cash transactions with the sales records.
Schedule staff shifts for the next day	As a branch manager, I would like to view the staff profiles so that I can plan staff shifts.
Changing of product price	As a branch manager, I would like to change the products prices so that I can encourage more sales.
Loss of sales report	As a branch manager, I would like to generate the loss-of-sales report to the owner so there is an official record of any errors and discrepancies.

5. System Use Case Diagram and Domain Model

5.1 Use Case Diagram

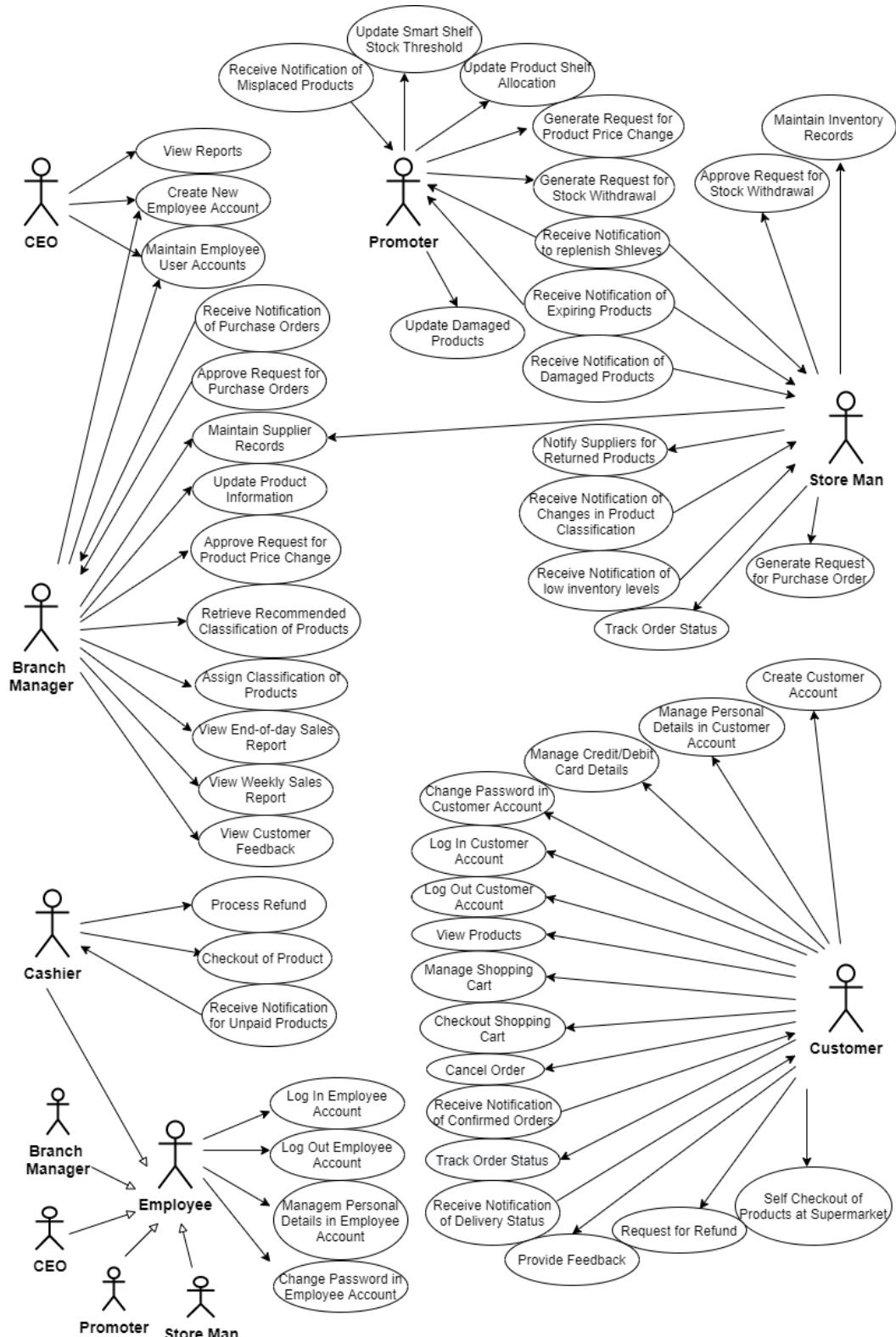


Figure 5-1 Use Case Diagram

5.2 Domain Model

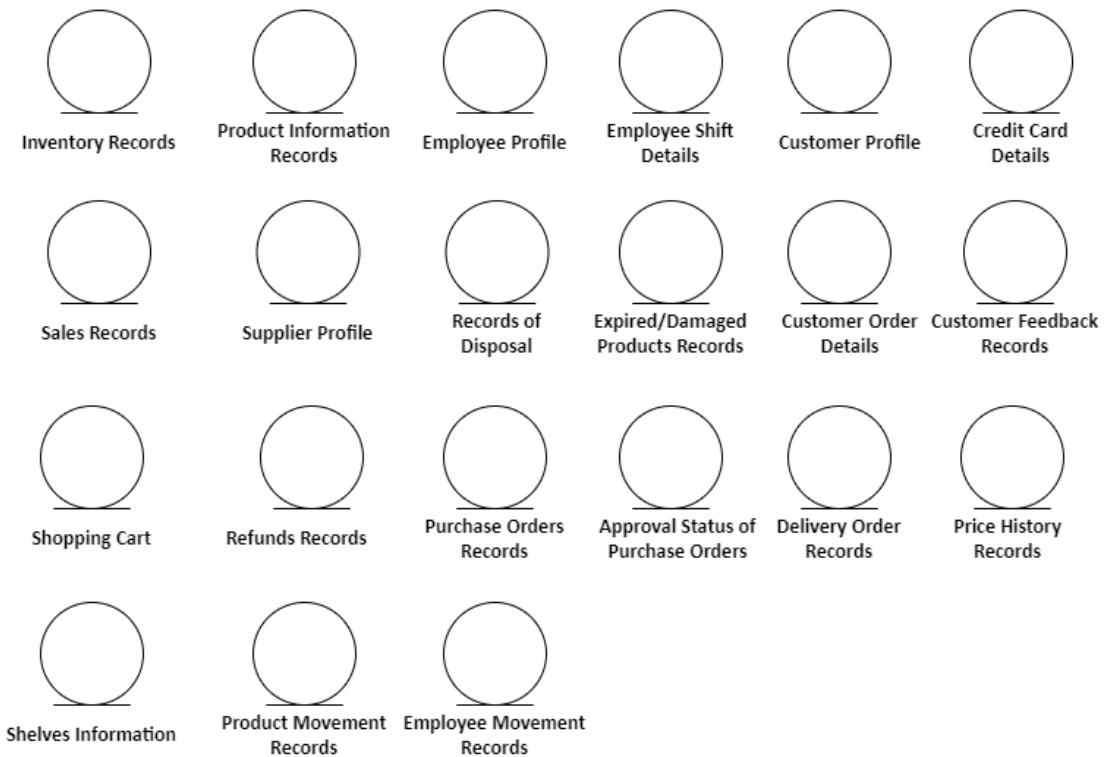


Figure 5-2 System Domain Model

5.3 Domain Model Description

Table 5-1 Domain Model Description

Entity	Description	Attributes / Columns
Inventory Records	Records of Product Stock	UPC ID, SKU ID, Units in Stock (Store), Units in Stock (Shelves)
Product Information Records	Records of Product Information	Product RFID ID, SKU ID, Product Name, Description, Expiry Date, Unit Price, Category (Fresh Food / Perishables), Classification (High / Medium / Low selling), Shelf Number, Discount, Unit Weight, Age Restriction
Employee Profile	Records of Employee Details	Employee ID, Employee Name, Designation, Password (Encrypted), Telephone Number, Age, Email, Employee RFID
Employee Shift Details	Records of Employee Shifts	Employee ID, Date, AM/PM
Customer Profile	Records of Customer Details	Customer ID, Customer Name, Telephone Number, Email, Age, Delivery Address
Credit Card Details	Records of Customer Credit Card Details (Stored encrypted)	Customer ID, Credit Card Number, Date of Expiry, Billing Address

Sales Records	Records of Sales (online & offline)	SKU ID, Quantity Sold, Cash Received, Amount Received (Non-cash), Discount Applied
Supplier Profile	Records of Suppliers information	Supplier ID, Supplier Name, Email, Phone Number, Address, Supplier Category (good/bad)
Records of Disposal	Records of Expired/Damaged Products	SKU ID, Damaged / Expired, Quantity, Date of Disposal
Expired / Damaged Products Records	Records of Expired/Damaged Products Disposed	SKU ID, Damaged / Expired, Quantity, Data of Damage / Expiry
Customer Order Details	Records of Customer Orders	Customer Order ID, SKU ID, Quantity, Delivery Status, Total Price, Order Date, Customer ID, Delivery Date
Customer Feedback Records	Records of Customer Feedback	Customer Order ID, Date of Feedback, Feedback
Shopping Cart	Items added to cart but yet to be purchased	Customer ID, SKU ID, Quantity, Total Price, Date of Creation, Total Discount
Refunds Records	Records of refunds processed	Customer ID (non-compulsory), SKU ID, Quantity, Total Refunded, Reason of Refund
Approval Status of Purchase Orders	Approval status of purchase orders	Supplier Order ID, Supplier ID, Approved Status (Approved/ Not approved)
Purchase Orders Records	Records of Purchase Orders made to suppliers	Record ID, UPC ID, SKU ID, Ordered Quantity, Supplier Order ID, Estimated Delivery Date
Delivery Order Records	Records of Delivery Orders	Supplier Order ID, Quantity Delivered, Delivery Date, SKU ID
Price History Records	Historical Records of prices	UPC ID, New Unit Price, Time/Date of Change
Shelves Information	Records of Shelves Information	Aisle Number, Shelf Number, SKU ID, Low Stock Threshold
Product Movement Records	Records of Product Movement in Supermarket	Product Movement Record ID, Location ID, Product RFID
Employee Movement Records	Records of Employee Movement in Supermarket	Employee Movement Record ID, Location ID, Employee RFID

6. Functional Requirement

6.1 Activity Diagrams and Class Diagrams

6.1.1 Branch Manager

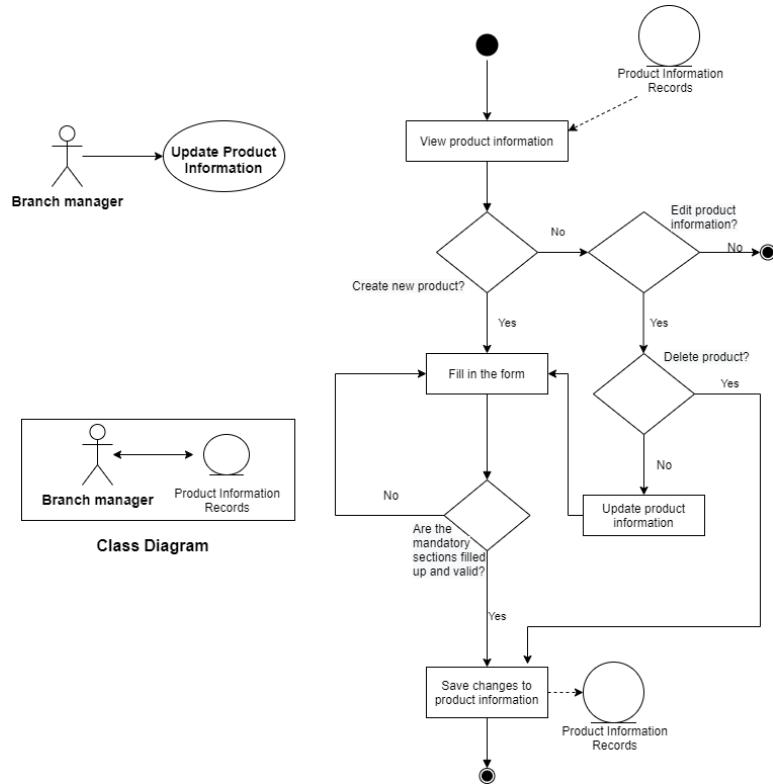


Figure 6-1 Branch Manager Updates Product Information

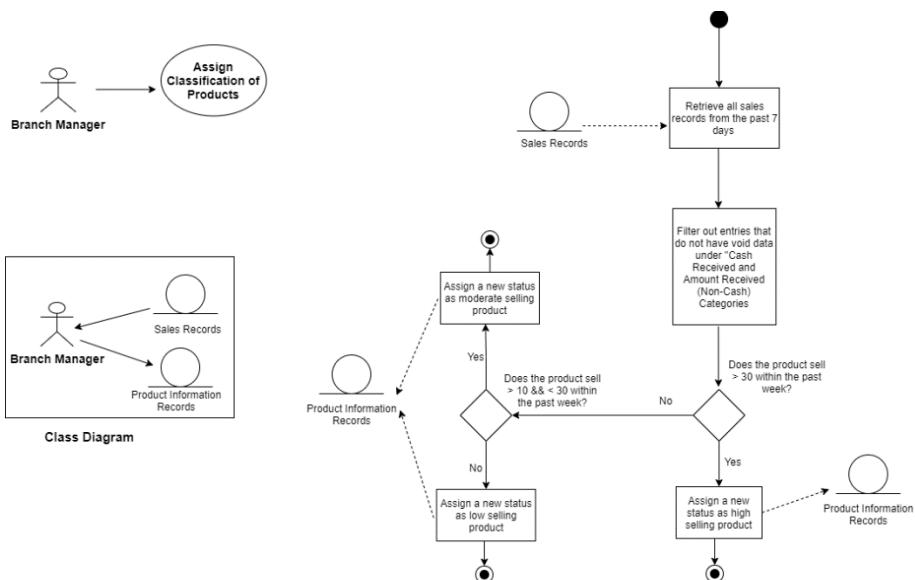


Figure 6-2 Branch Manager Assigns Classification of Products

6.1.2 Store Man

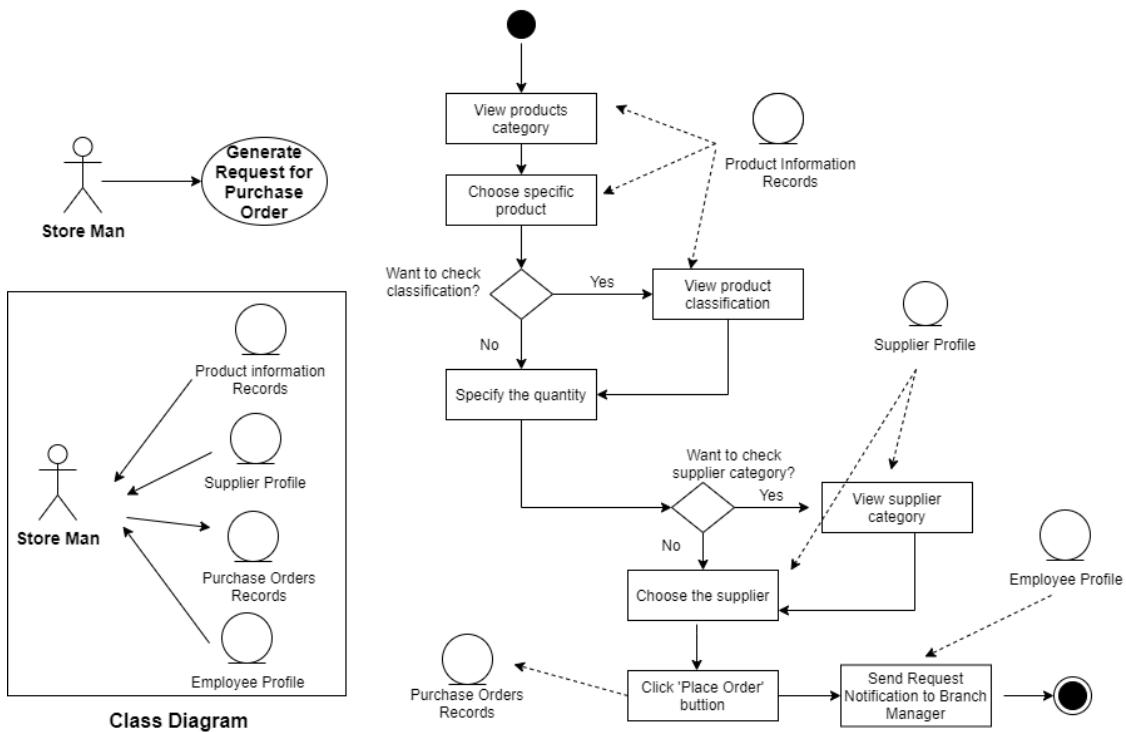


Figure 6-3 Store Man Generates Request for Purchase Order

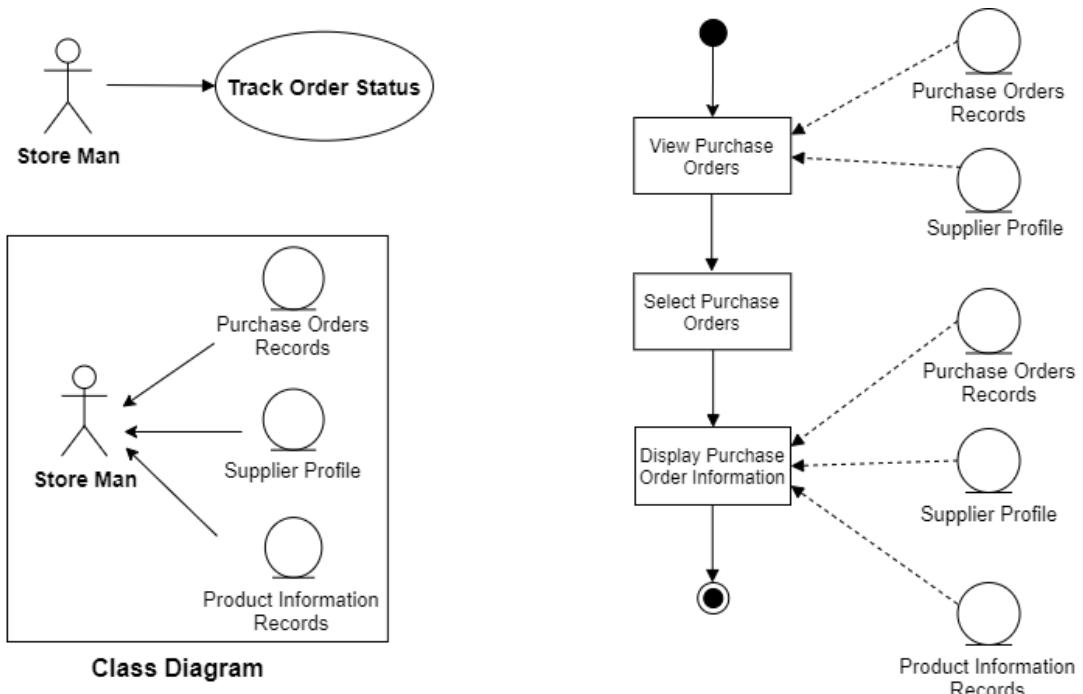


Figure 6-4 Store Man Tracks Order Status

6.1.3 Store Man & Promoter

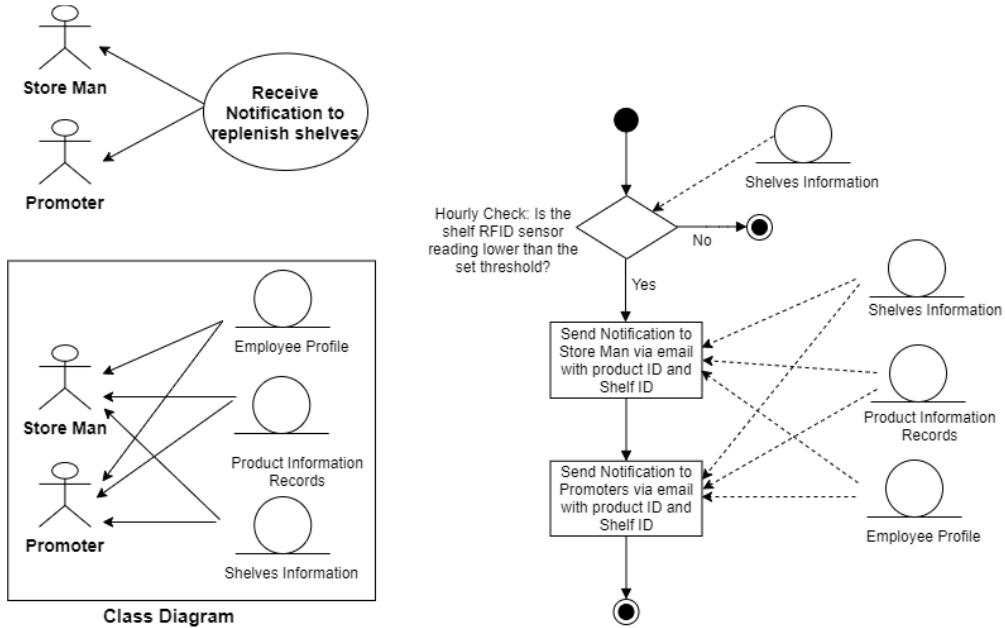


Figure 6-5 Store Man and Promoter Receive Notification to Replenish Shelves

6.1.4 Cashier

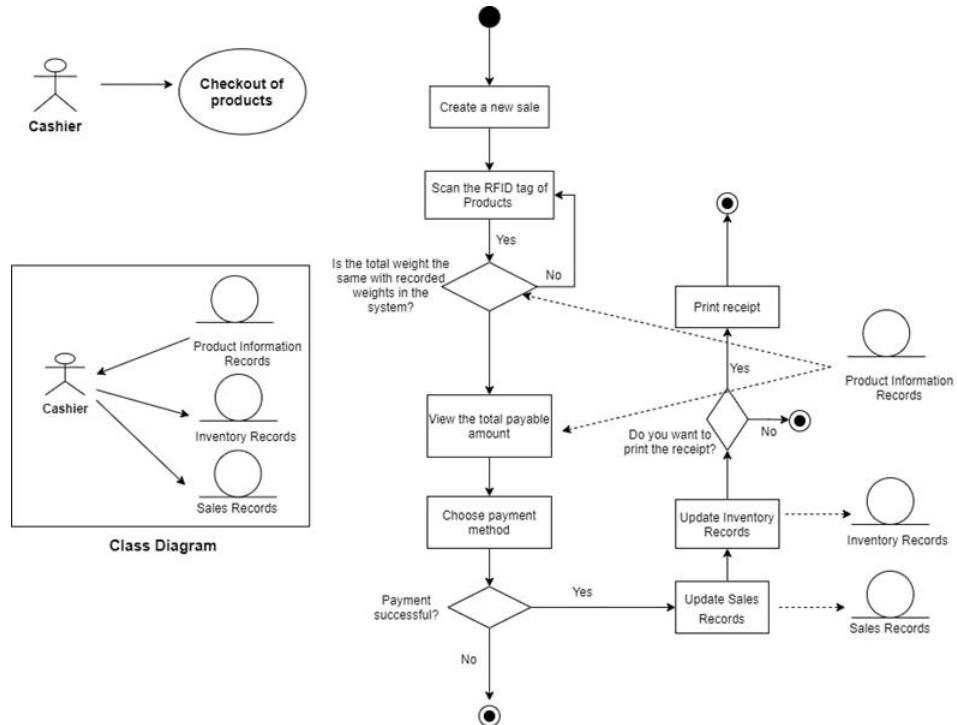


Figure 6-6 Cashier Checks out of Products

6.1.5 Promoter

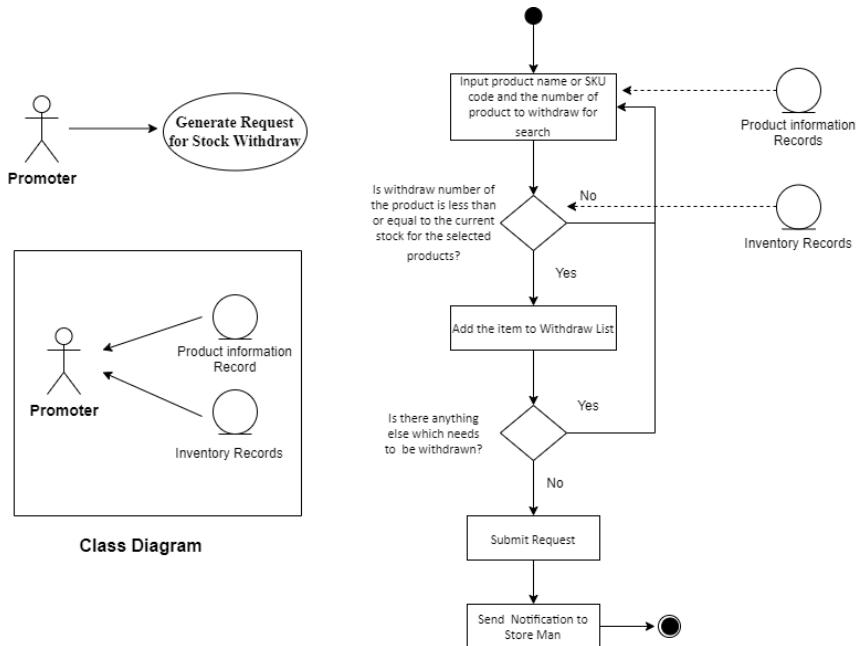


Figure 6-7 Promoter Generates Request for Stock Withdraw

6.1.6 Customer

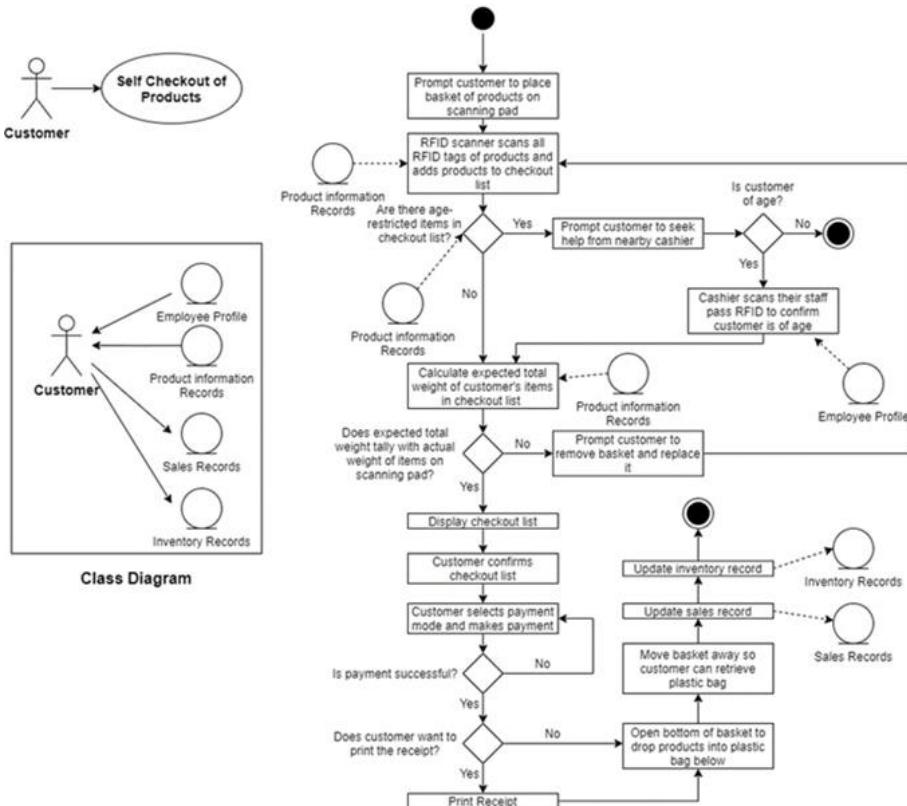


Figure 6-8 Customer conducts Self-Checkout of Products at Supermarket

6.2 Screen/Print-Out Design

6.2.1 Customer's Desktop and Mobile UI

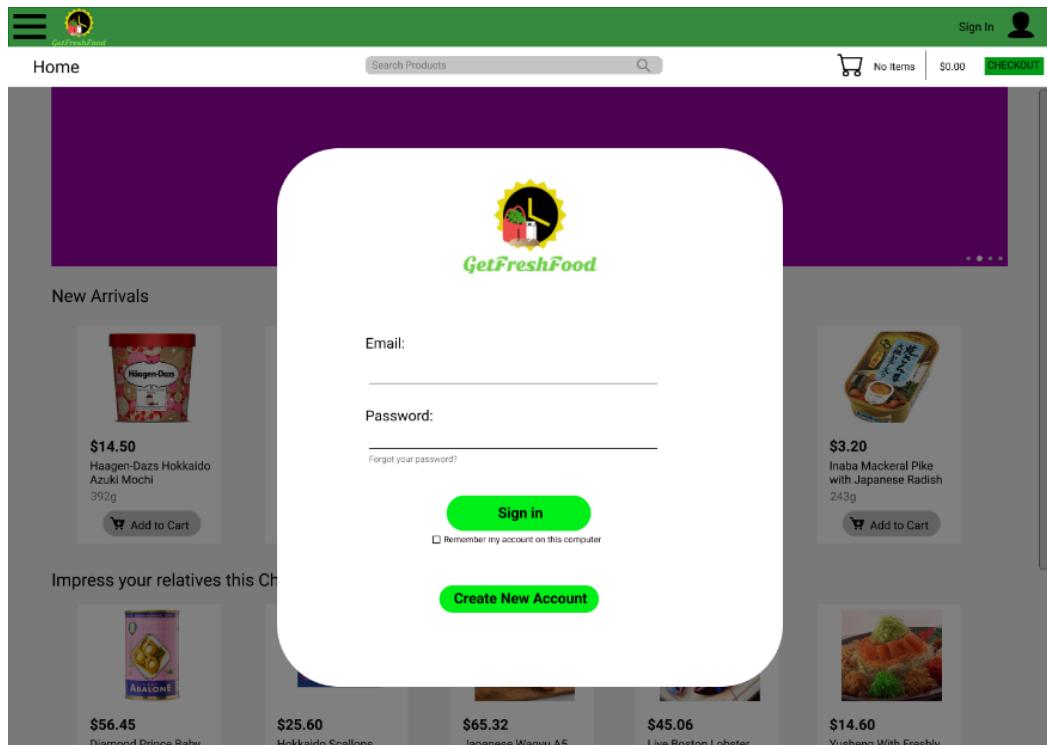


Figure 6-9 Login (Desktop)

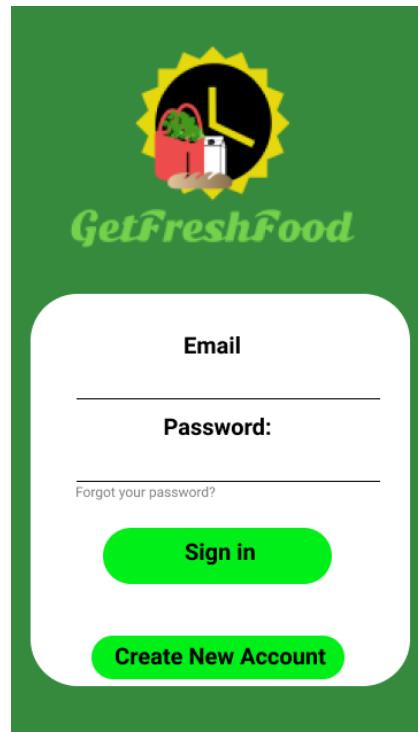


Figure 6-10 Login (Mobile)

Welcome, John Doe 

Manage Profile 

 No Items \$0.00 CHECKOUT

Name :

Date of Birth:

Address:

Postal code:

Contact Number:

Email address:

I would like to receive email on upcoming promotions and events
 I would like to receive email notification about my orders

Save Changes

[Manage Payment Details](#)

Figure 6-11 Manage Profile (Desktop)

Manage Profile

Name:

Date of Birth:

Address:

Postal Code:

Contact Number:

Email Address:

I would like to receive email on upcoming promotions and events
 I would like to receive email notification about my orders

Save Changes

[Manage Payment Details](#)

Figure 6-12 Manage Profile (Mobile)

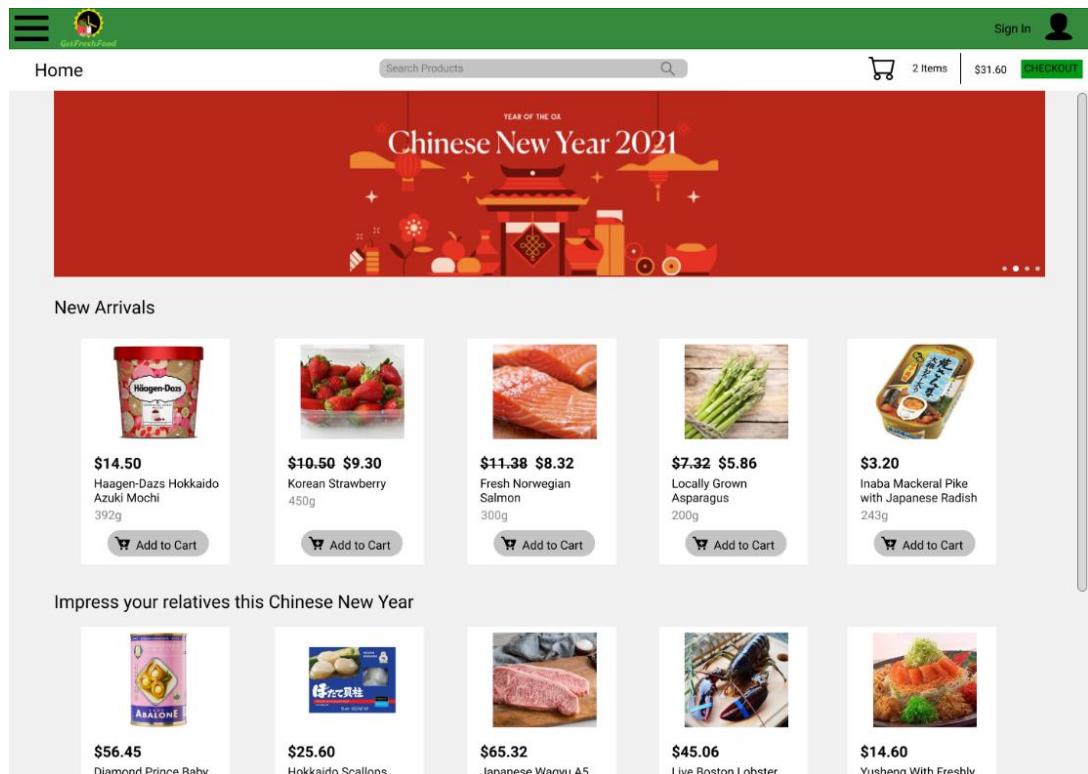


Figure 6-13 Front Page (Desktop)

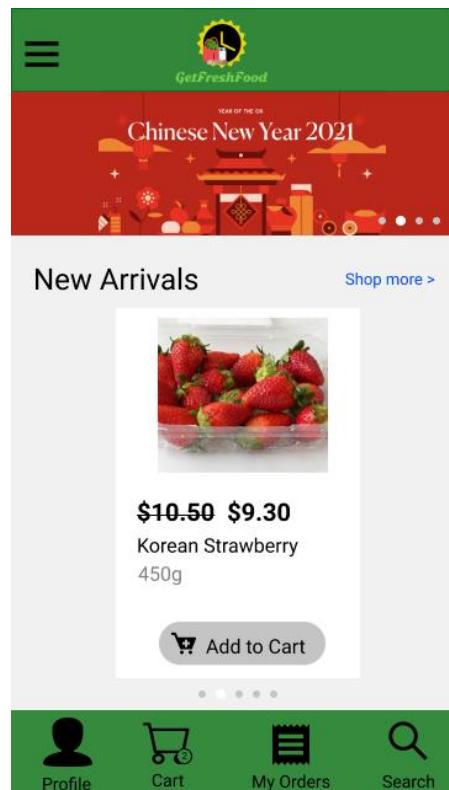


Figure 6-14 Front Page (Mobile)

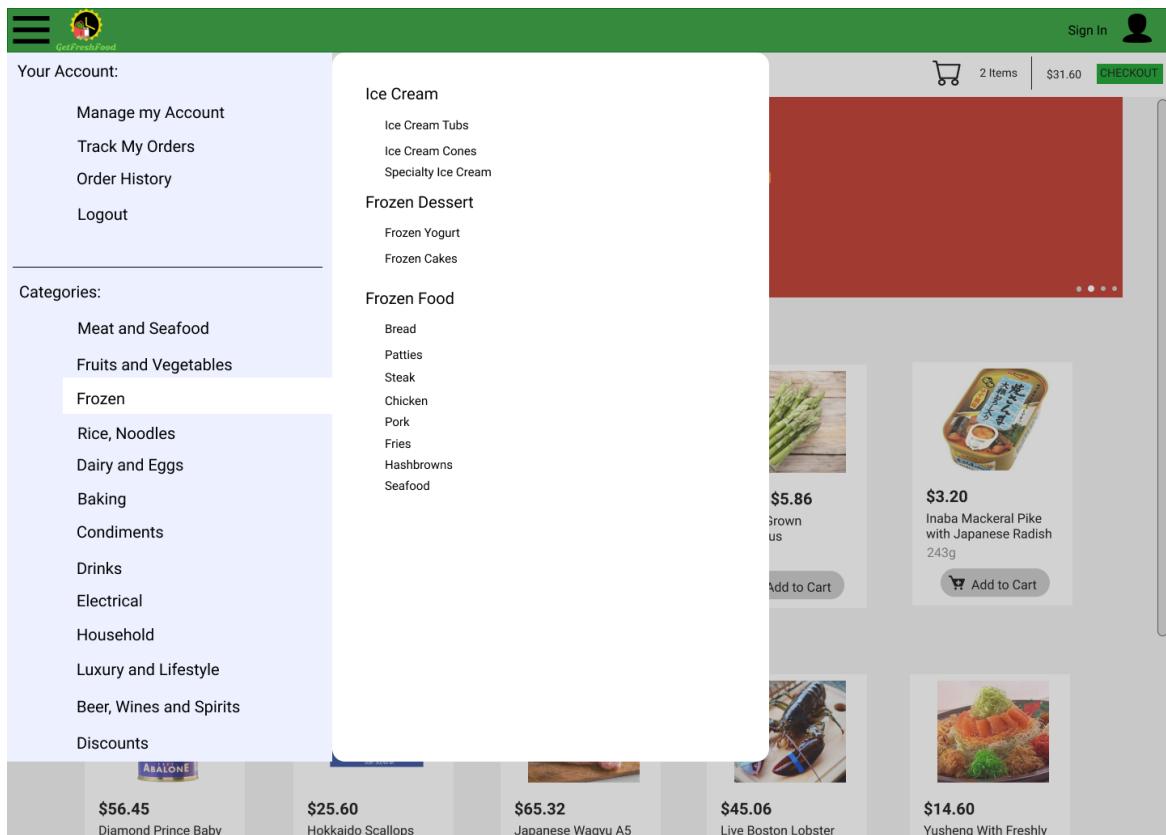


Figure 6-15 Navigation Bar (Desktop)

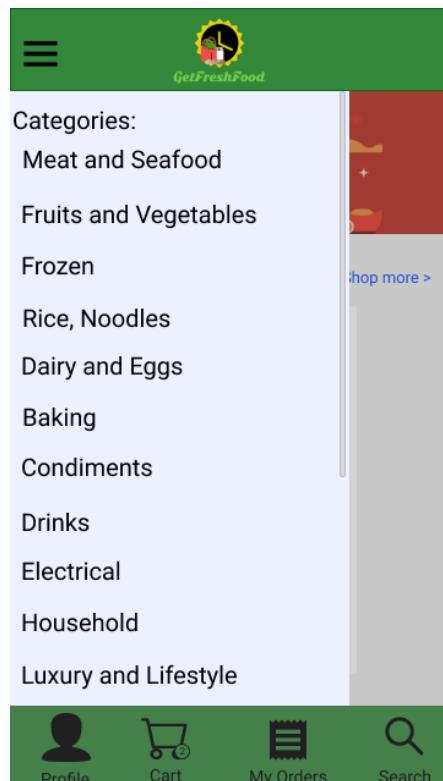


Figure 6-16 Navigation Bar (Mobile)

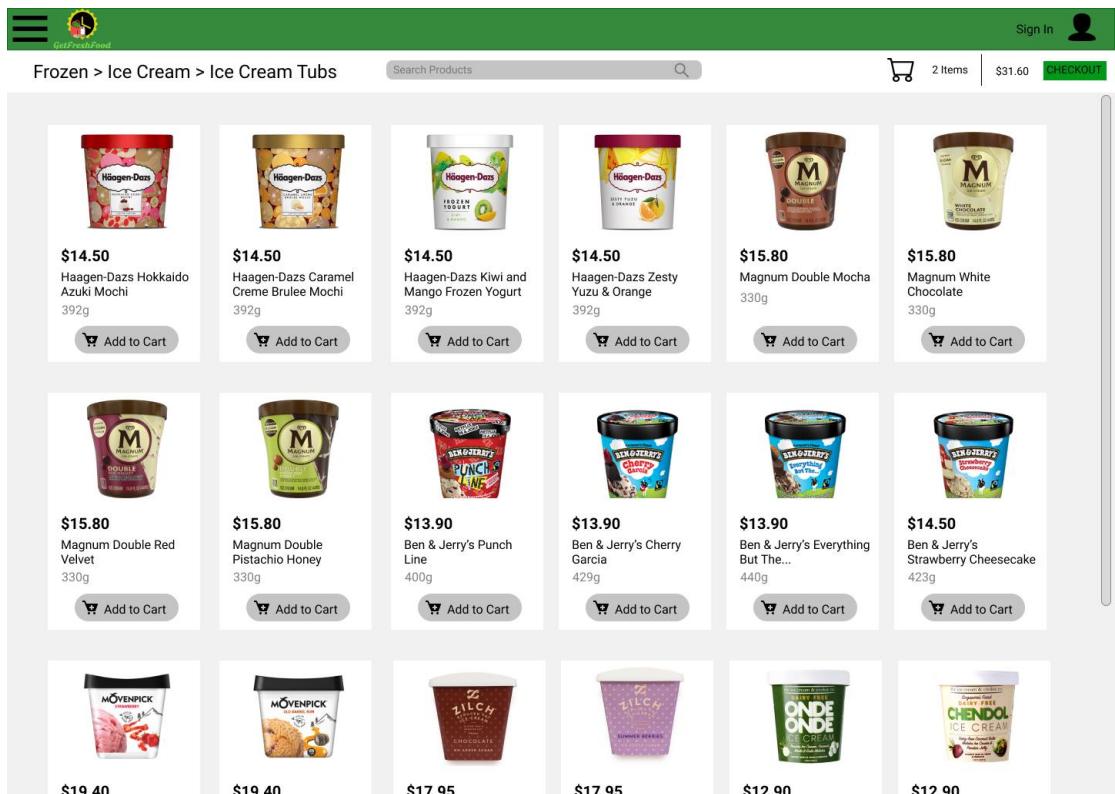


Figure 6-17 Product List (Desktop)

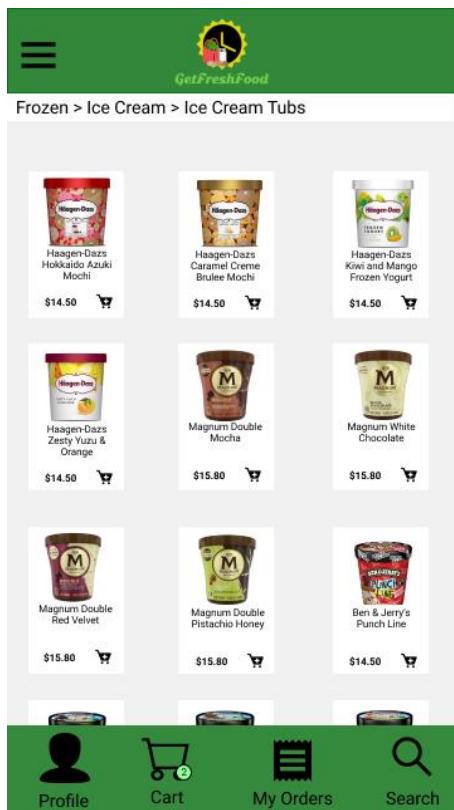


Figure 6-18 Product List (Mobile)

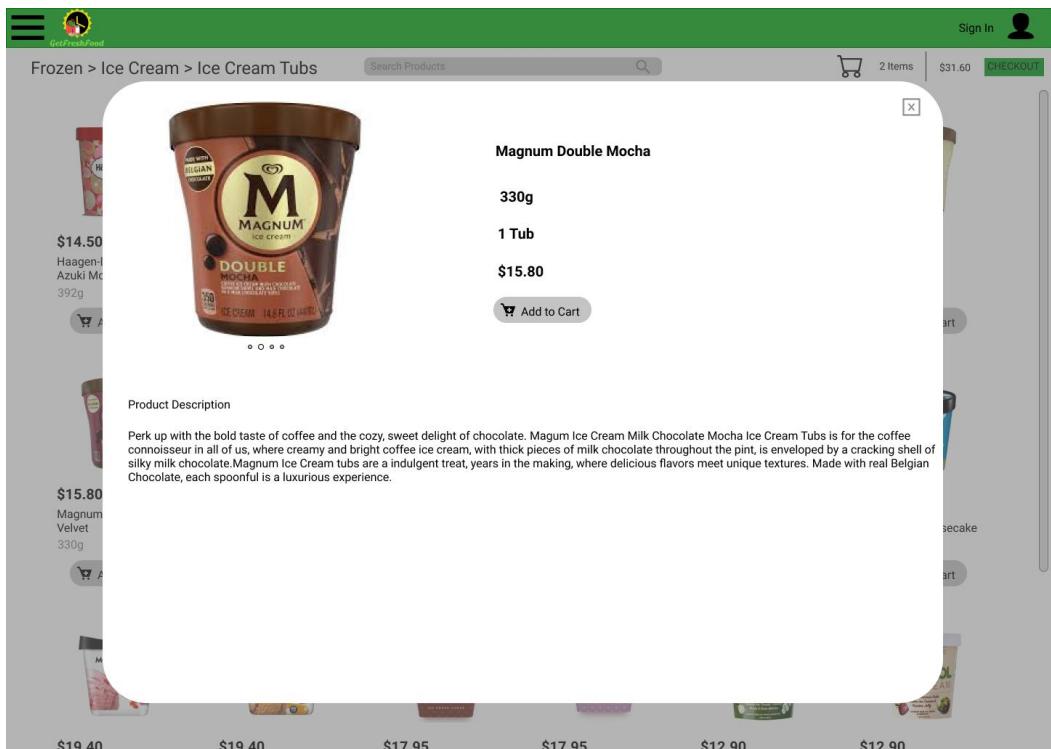


Figure 6-19 Product Details (Desktop)

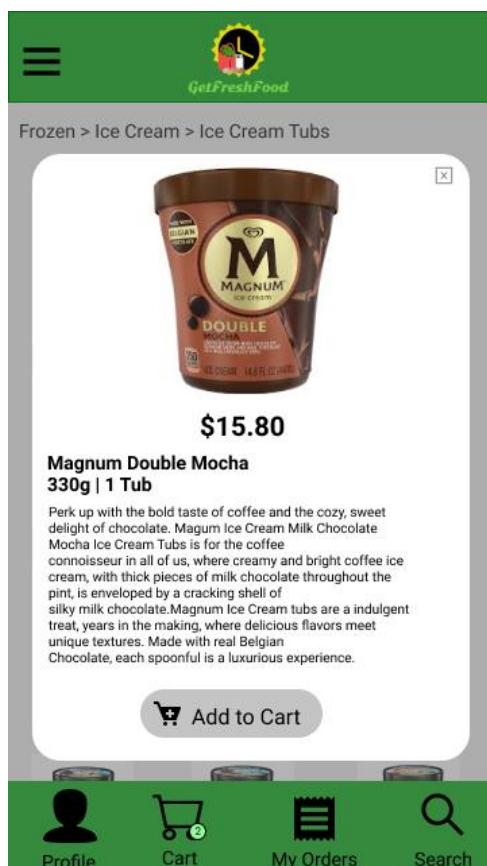


Figure 6-20 Product Details (Mobile)

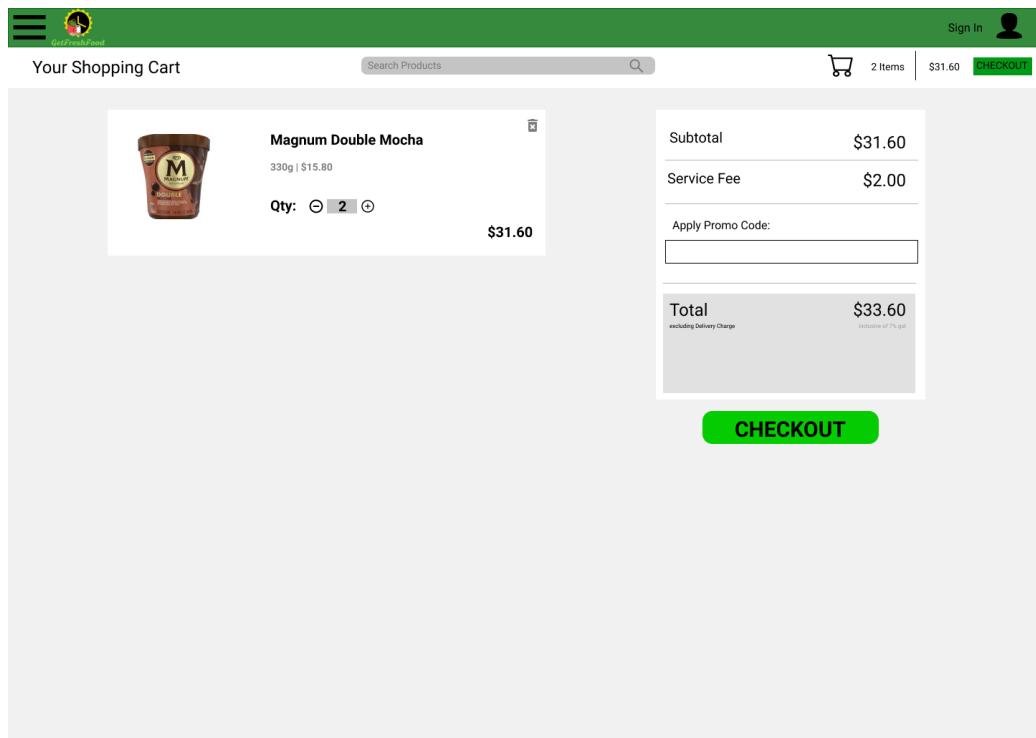


Figure 6-21 Shopping Cart (Desktop)

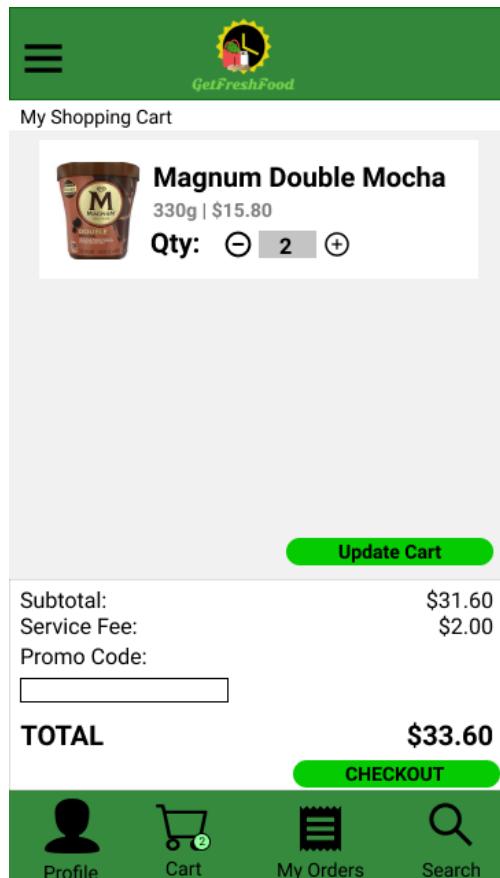


Figure 6-22 Shopping Cart (Mobile)

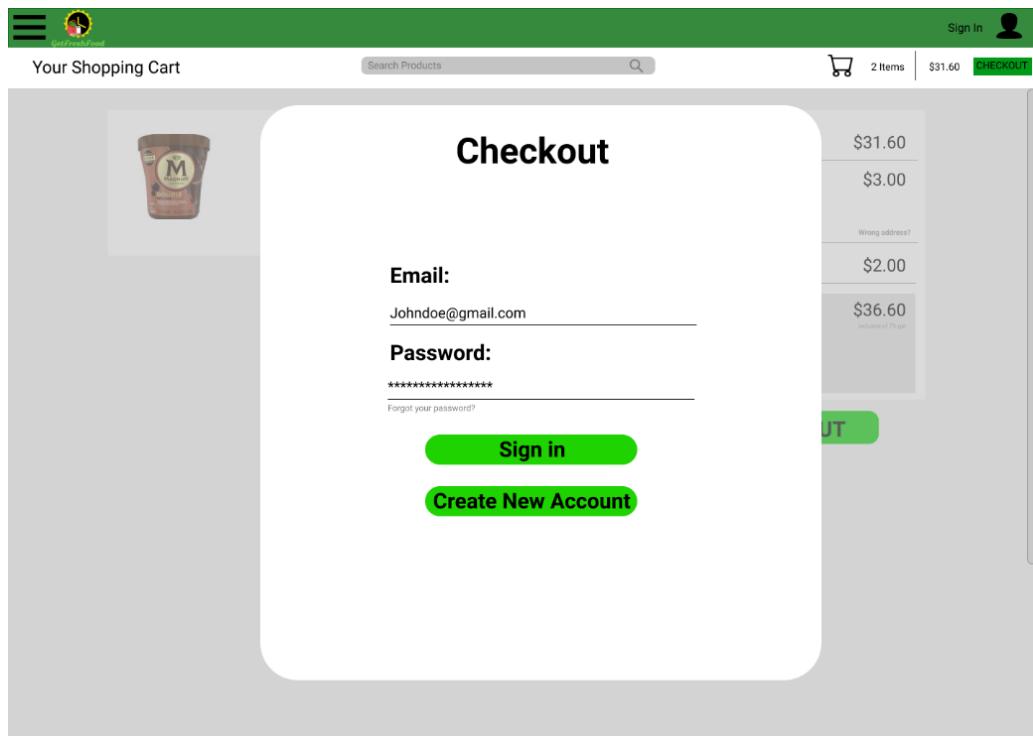


Figure 6-23 Check-Out (Desktop)

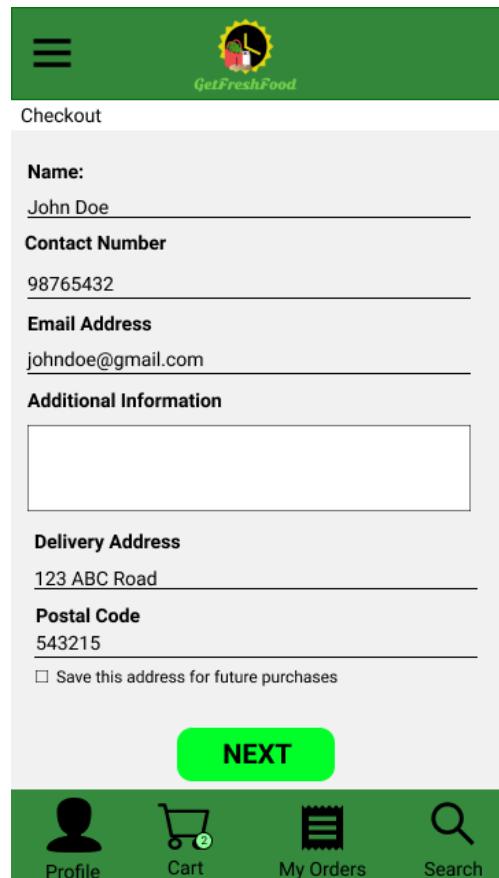


Figure 6-24 Check-Out (Mobile)

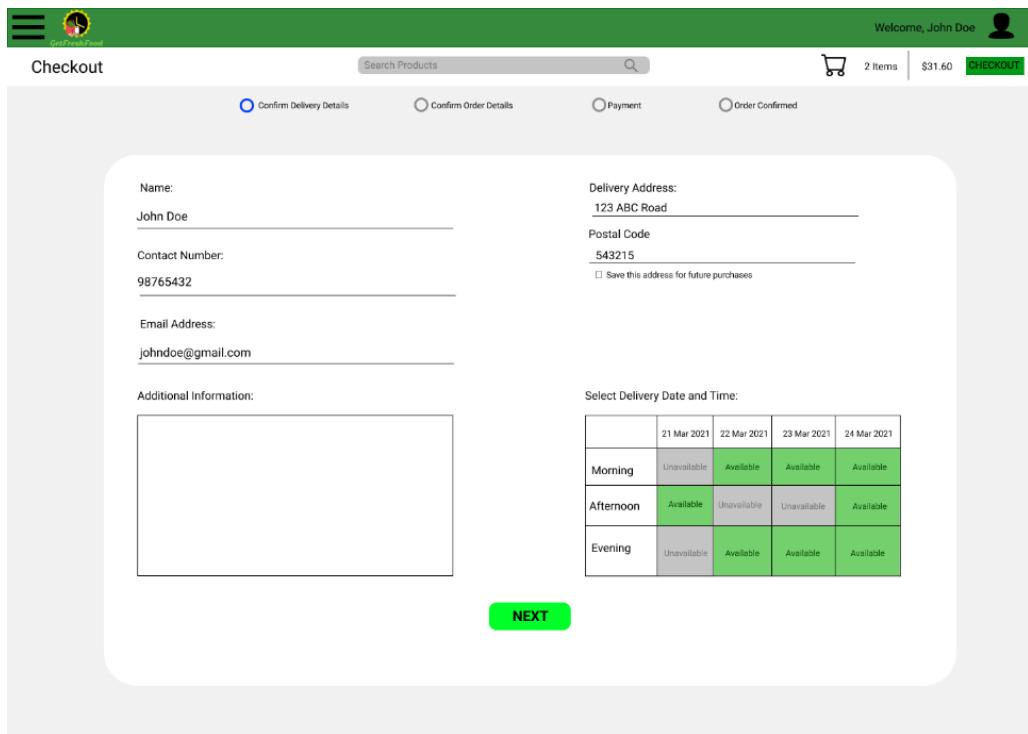


Figure 6-25 Check Out - Confirm Order Details I (Desktop)



Figure 6-26 Check Out - Confirm Order Details I (Mobile)

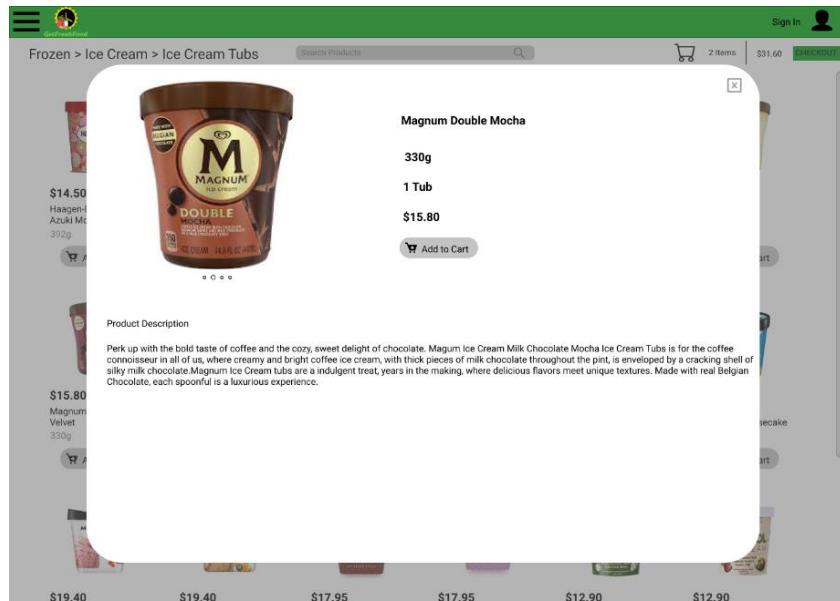


Figure 6-27 Check Out - Confirm Order Details 2 (Desktop)

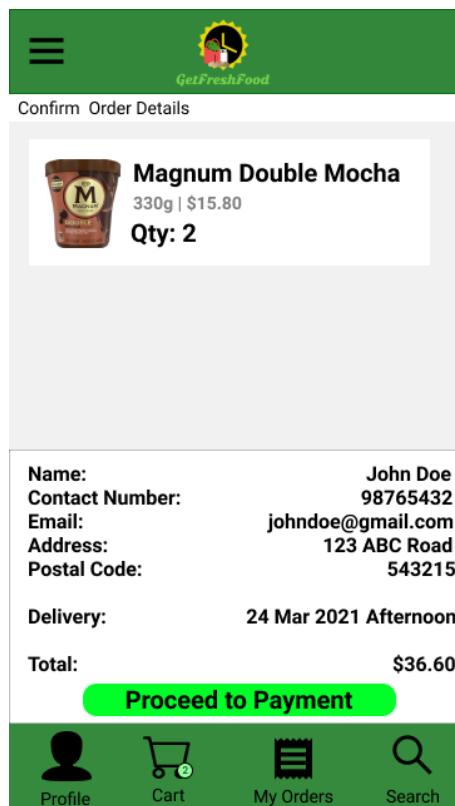


Figure 6-28 Check Out - Confirm Order Details 2 (Mobile)

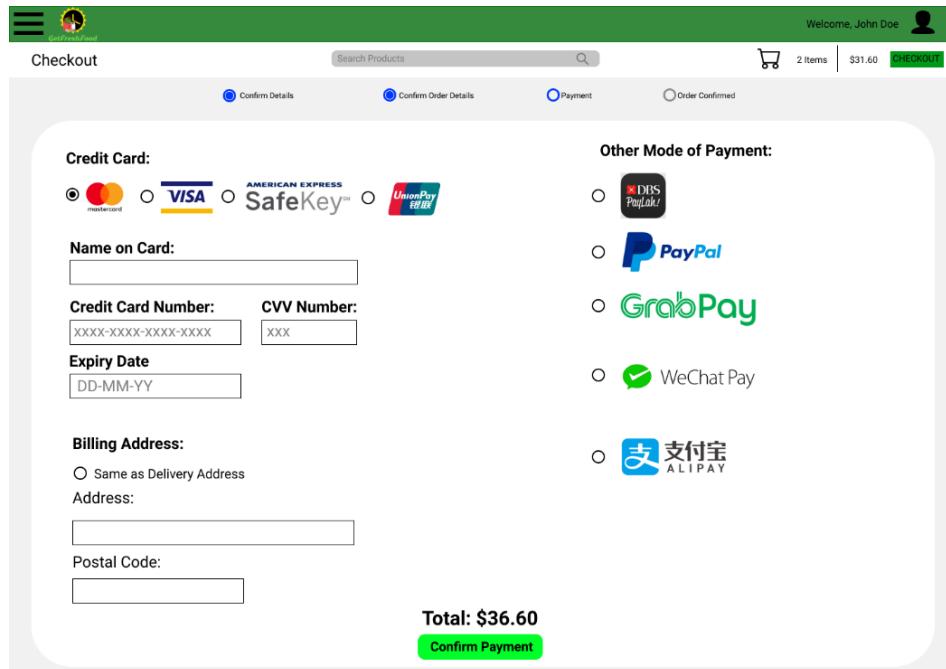


Figure 6-29 Check Out - Payment (Desktop)

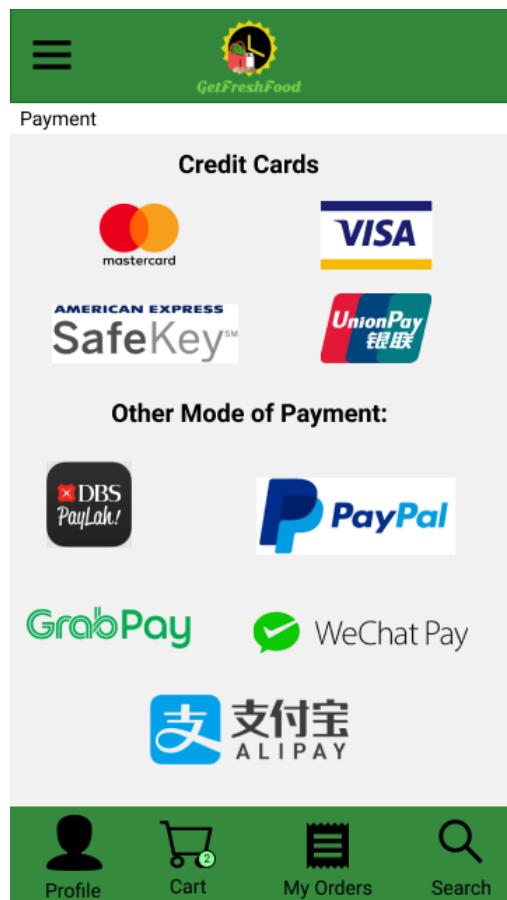


Figure 6-30 Check Out - Payment I (Mobile)

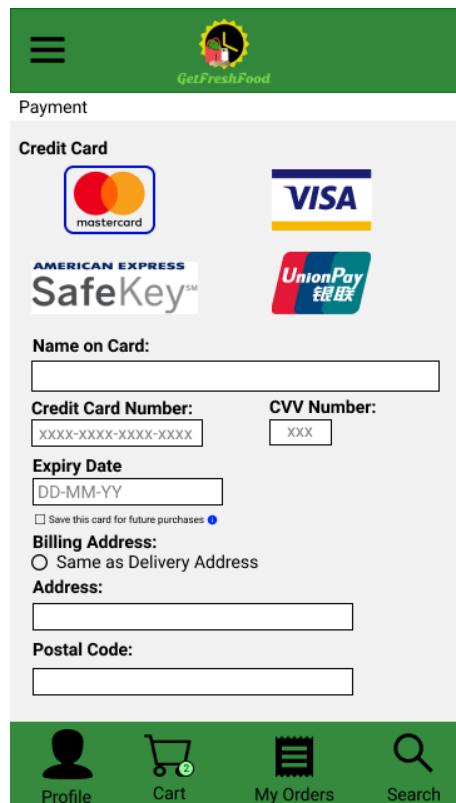


Figure 6-31 Check Out - Payment 2 (Mobile)

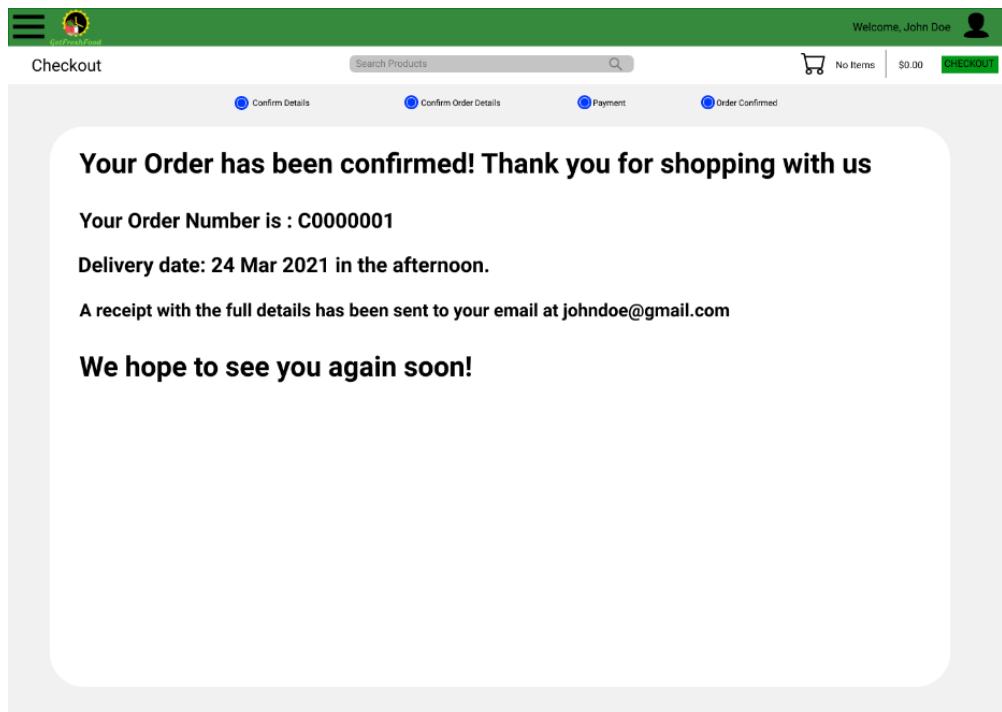


Figure 6-32 Check Out - Order Confirmed (Desktop)

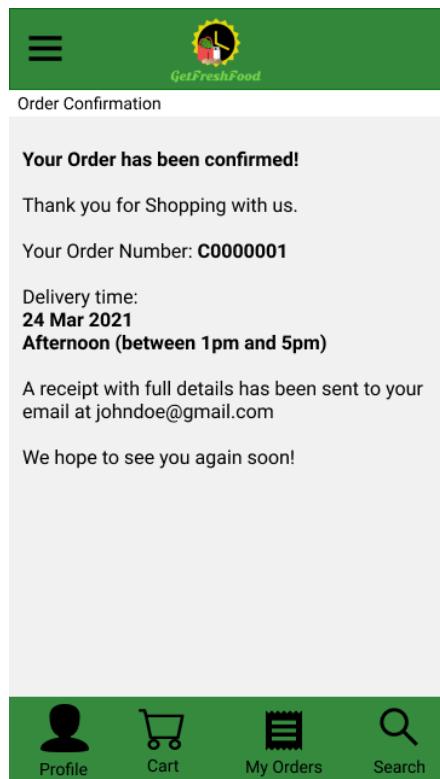


Figure 6-33 Check Out - Order Confirmed (Mobile)

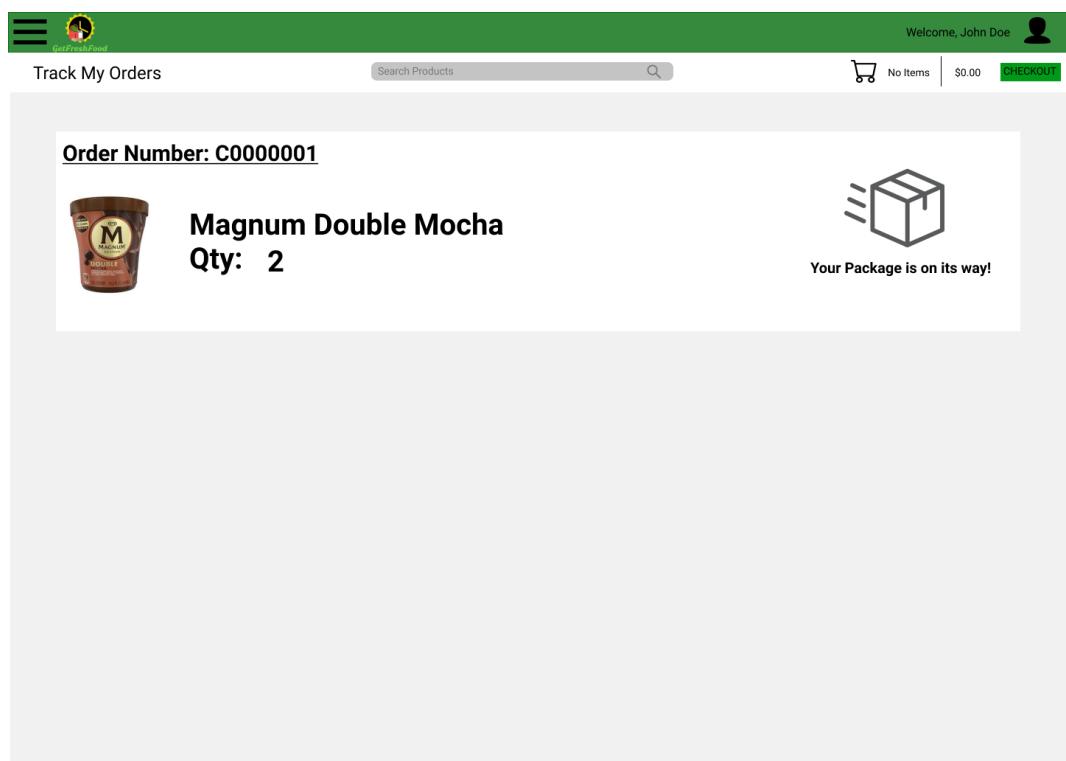


Figure 6-34 Order Tracking 1 (Desktop)

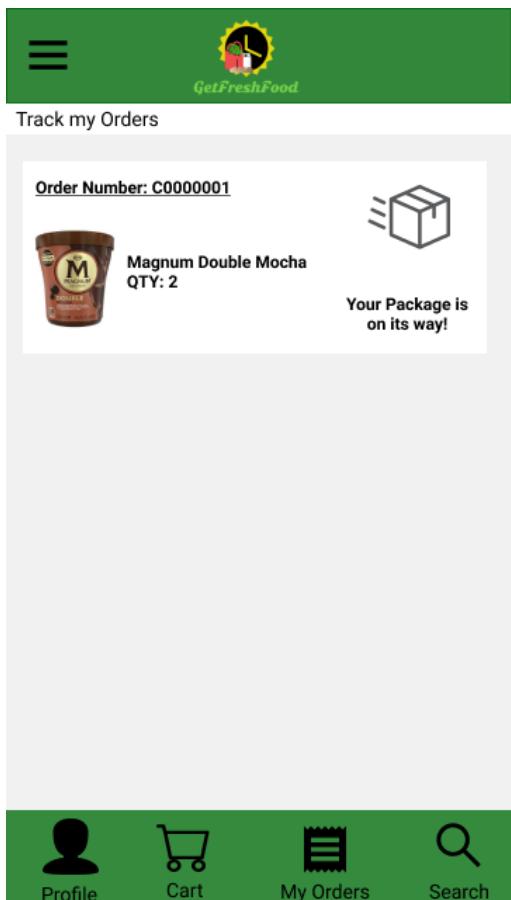


Figure 6-35 Order Tracking I (Mobile)

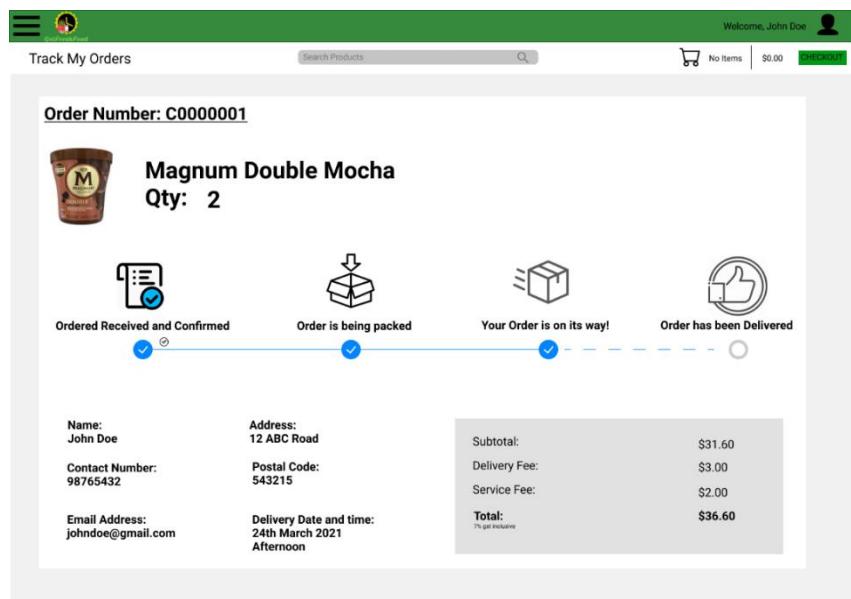


Figure 6-36 Ordering Tracking 2 (Desktop)

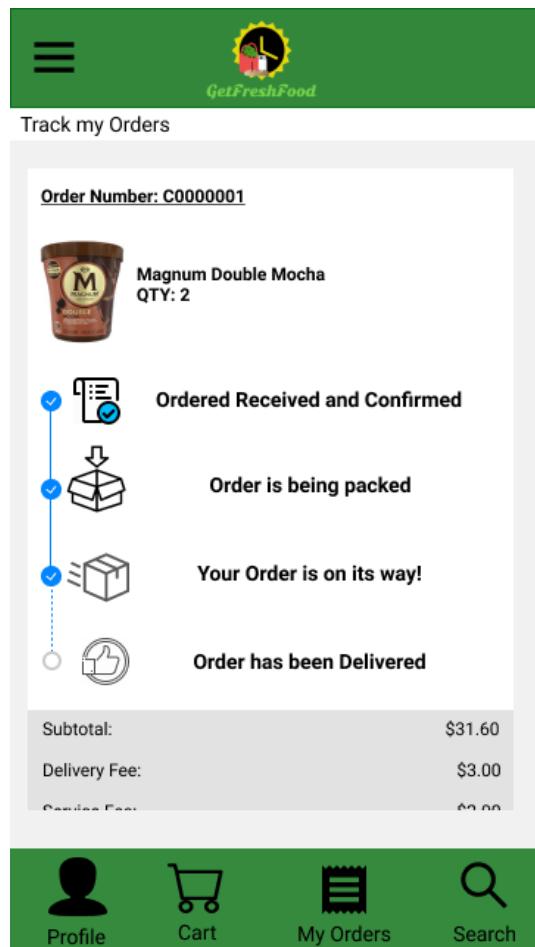


Figure 6-37 Order Tracking 2 (Mobile)

6.2.2 Employee's Desktop UI

6.2.2.1 Employees' Common Desktop UI

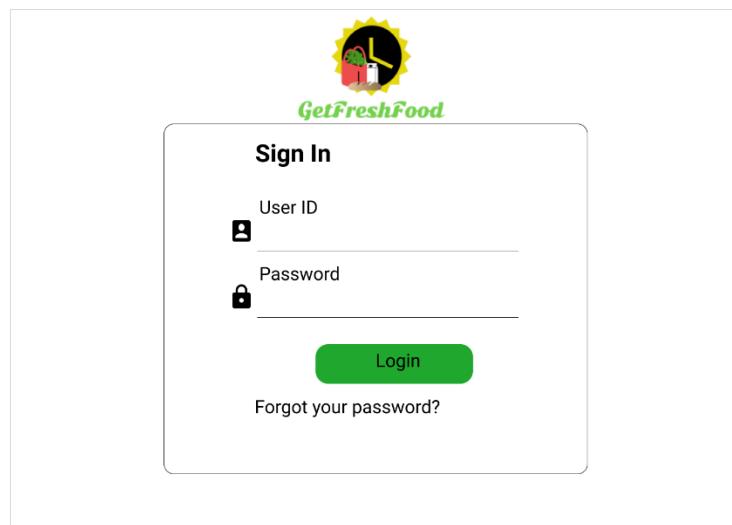


Figure 6-38 Login



GetFreshFood

Tom
Store Man ▾

Manage Profile

Name :

Employee ID:

Designation:

Phone No:

Age:

Email address:

Save Changes

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-39 Manage Profile



GetFreshFood

Tom
Store Man ▾

Change Password

Old Password:

New Password:

Confirm New Password:

Save

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-40 Change Password

6.2.2.2 Branch Manager's Desktop UI

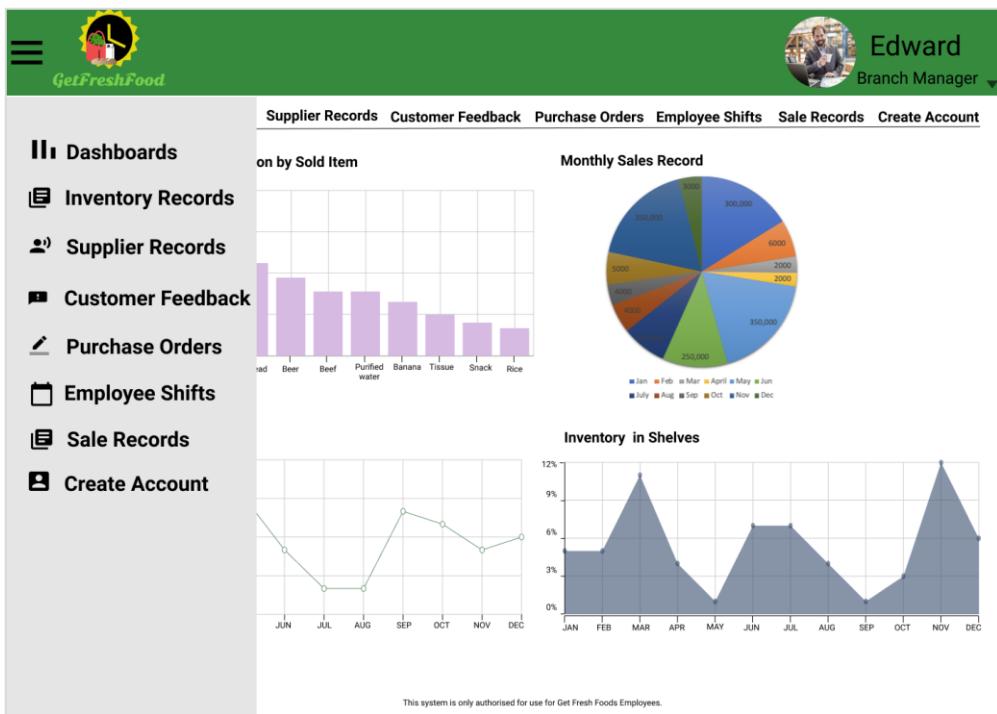


Figure 6-41 Navigation Bar

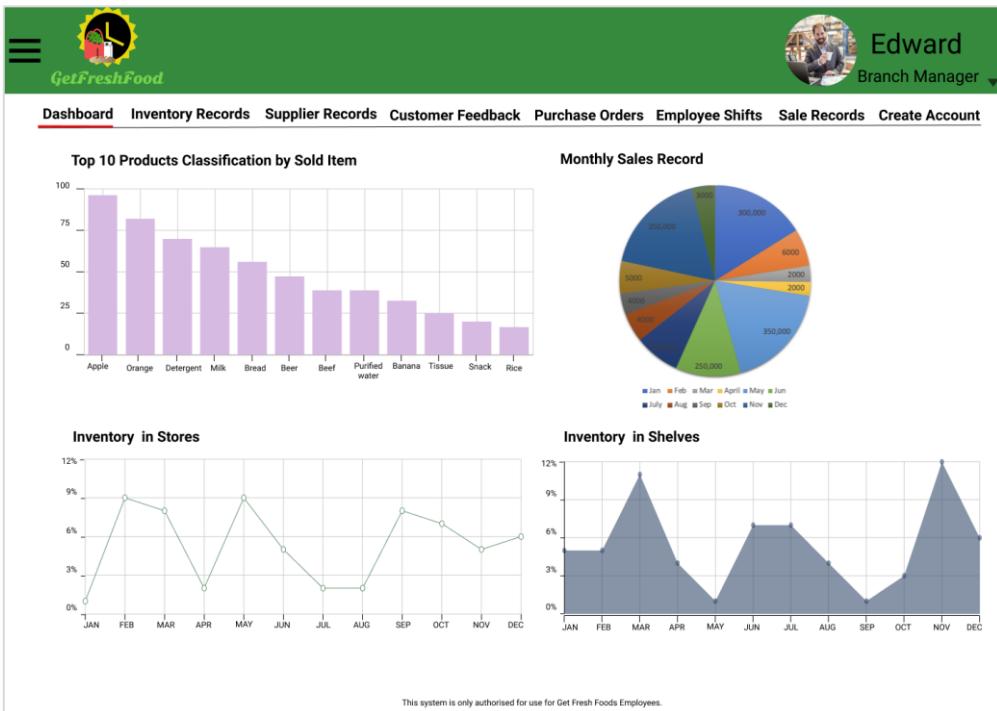


Figure 6-42 Dashboard



Edward
Branch Manager ▾

Dashboard **Inventory Records** Supplier Records Customer Feedback Purchase Orders Employee Shifts Sale Records Create Account

Search UPC ID or SKU ID 🔍

No	UPC ID ▼	SKU ID ▼	Product Name ▼	Category ▼	Classification ▼	Expire date ▼	Unit In Stock(Shelves)	Unit InStock(Store)
1	023456723456	SKU(MDEEE00qwd92	Orange	Perishables	Medium	26-Mar-2021	30	145
2	012434344343	SKU(MDUUUUUwer323	Milk	Perishables	High	25-Mar-2021	26	200
3	012434000012	SKU(MDUEEEEwe345	Bread	Perishables	Low Selling	30-Mar-2021	15	55

Update

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-43 Inventory Records



Edward
Branch Manager ▾

Dashboard **Inventory Records** **Supplier Records** Customer Feedback Purchase Orders Employee Shifts Sale Records Create Account

Search Supplier Information 🔍

No	Supplier Name ▼	Email ▼	Phone No ▼	Address ▼	Supplier Category ▼
1	Cablee moh seng pte.ltd	cablee@gmail.com	86340580	no222, Kim Tian Place, Bukit Merch	Good
2	Hin Leong pte.ltd	hinleong@gmail.com	86356789	no32, Yewtee, Bukit Merch	Medium
3	K2 Trading pte.ltd	k2trading@gmail.com	86345789	no234, Kim Tian Place, Bukit Merch	Good

Update

This system is only authorised for use for Get Fresh Foods Employees.

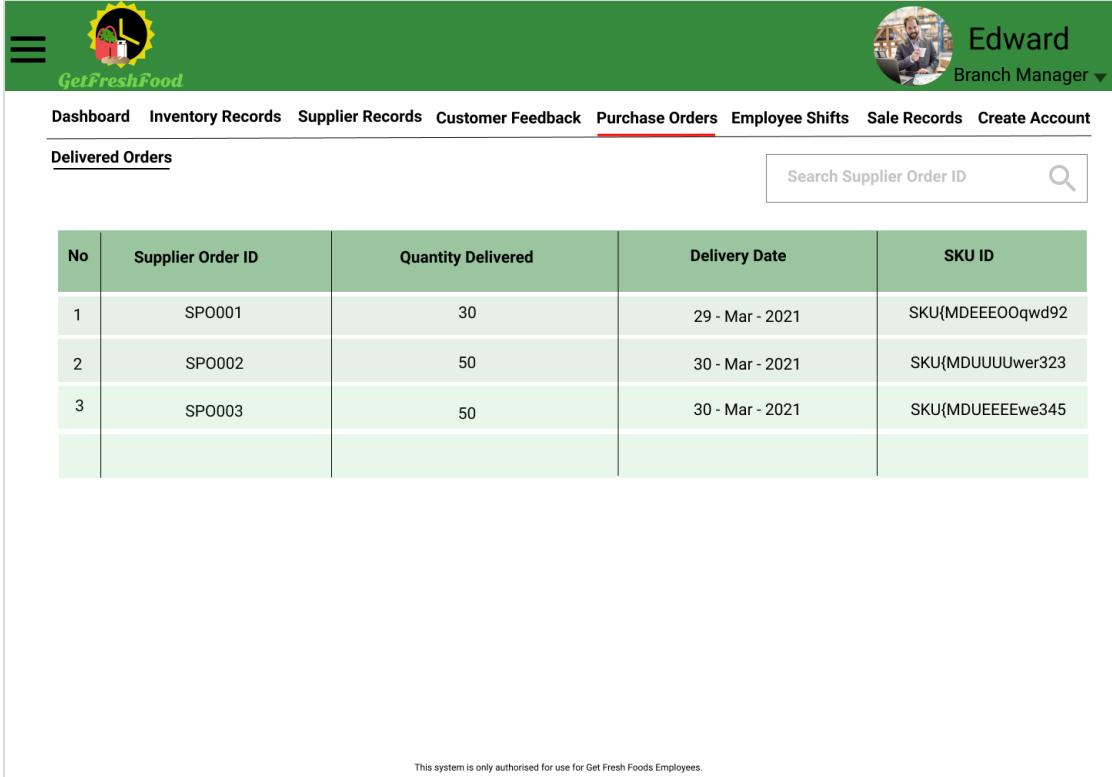
Figure 6-44 Supplier Records

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-45 Customer Feedback

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-46 All Purchase Orders



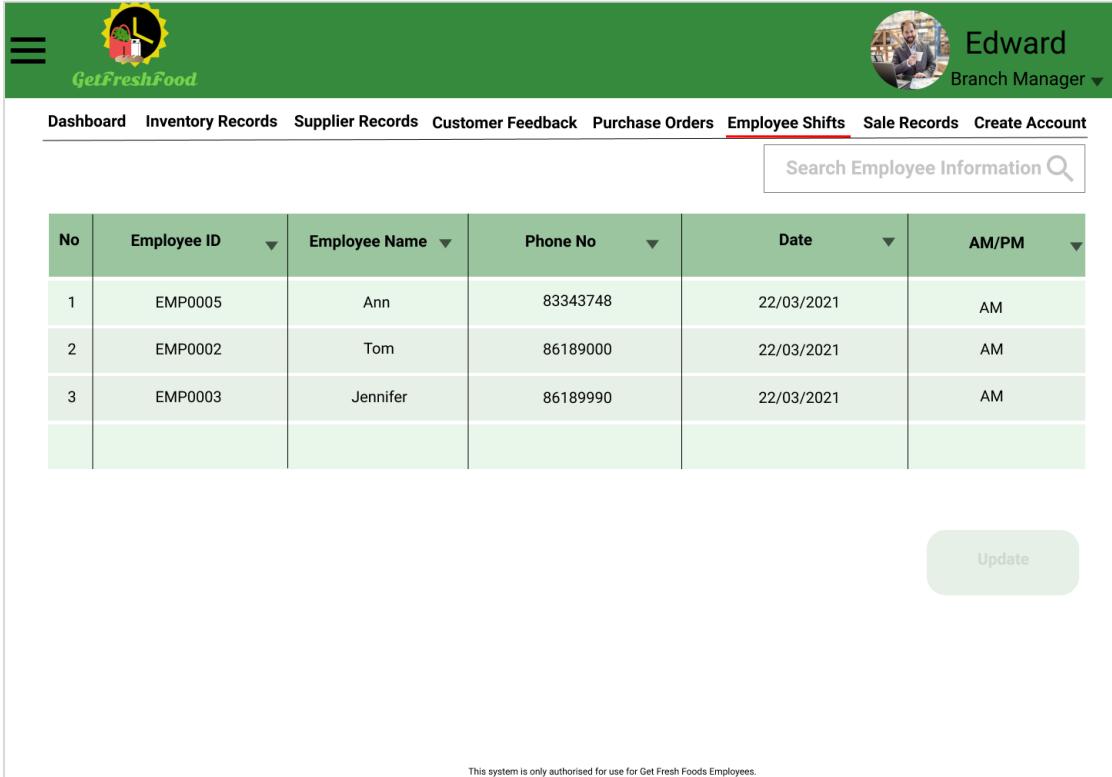
The screenshot shows a web-based application interface for managing food supplies. At the top, there's a navigation bar with links: Dashboard, Inventory Records, Supplier Records, Customer Feedback, Purchase Orders (which is underlined, indicating it's the active page), Employee Shifts, Sale Records, and Create Account. On the right side of the header, there's a user profile for 'Edward' (Branch Manager) with a small profile picture.

The main content area is titled 'Delivered Orders'. It features a search bar labeled 'Search Supplier Order ID' with a magnifying glass icon. Below the search bar is a table with the following columns: No, Supplier Order ID, Quantity Delivered, Delivery Date, and SKU ID. The table contains three rows of data:

No	Supplier Order ID	Quantity Delivered	Delivery Date	SKU ID
1	SP0001	30	29 - Mar - 2021	SKU(MDEEEOOqwd92
2	SP0002	50	30 - Mar - 2021	SKU(MDUUUUwer323
3	SP0003	50	30 - Mar - 2021	SKU(MDUEEEEwe345

At the bottom of the page, a small note reads: 'This system is only authorised for use for Get Fresh Foods Employees.'

Figure 6-47 Delivered Purchase Orders



This screenshot shows the 'Employee Shifts' section of the application. The navigation bar at the top is identical to Figure 6-47, with 'Purchase Orders' being the active page. The user profile for 'Edward' (Branch Manager) is also present.

The main content area has a search bar labeled 'Search Employee Information' with a magnifying glass icon. Below the search bar is a table with the following columns: No, Employee ID, Employee Name, Phone No, Date, and AM/PM. The table contains three rows of data:

No	Employee ID	Employee Name	Phone No	Date	AM/PM
1	EMP0005	Ann	83343748	22/03/2021	AM
2	EMP0002	Tom	86189000	22/03/2021	AM
3	EMP0003	Jennifer	86189990	22/03/2021	AM

A green button labeled 'Update' is located in the bottom right corner of the table area. A note at the bottom of the page states: 'This system is only authorised for use for Get Fresh Foods Employees.'

Figure 6-48 Employee Shifts

No	SKU ID	Quantity Sold	Cash Received	Amount Received	Discount Applied
1	SKU{MDEEEOOqwd92	40	2000	20	NA
2	SKU{MDUUUUUwer323	60	3000	50	10%
3	SKU{MDUEEEEwe345	50	1000	20	20%

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-49 Sale Records

Employee Lists				
Employee ID	Employee Name	Designation	Telephone No	Email
EMP0001	Edward	Store Manager	86183748	edward@gmail.com
EMP0002	Tom	Store Man	86189000	tom@gmail.com
EMP0003	Jennifer	Promoter	86189990	Jennifer@gmail.com

Figure 6-50 Create Account for New Employee

6.2.2.3 Store Man's Desktop UI

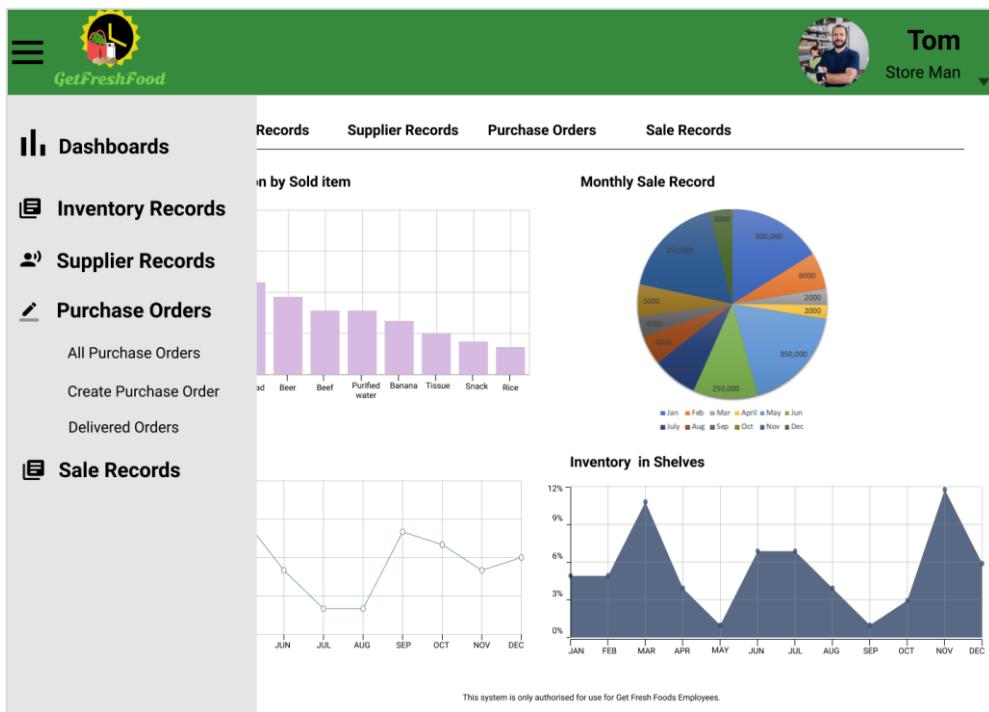


Figure 6-51 Navigation Bar



Figure 6-52 Dashboard

No	UPC ID	SKU ID	Product Name	Category	Classification	Expire date	Unit In Stock(Shelves)	Unit InStock(Store)
1	023456723456	SKU(MDEEEOOqwd92	Orange	Perishables	Medium	26-Mar-2021	30	145
2	012434344343	SKU(MDUUUUUwer323	Milk	Perishables	High	25-Mar-2021	26	200
3	012434000012	SKU(MDUEEEEwe345	Bread	Perishables	Low Selling	30-Mar-2021	15	55

Figure 6-53 Inventory Records

No	Supplier Name	Email	Phone No	Address	Supplier Category
1	Cablee moh seng pte.ltd	cablee@gmail.com	86340580	no222, Kim Tian Place, Bukit Merch	Good
2	Hin Leong pte.ltd	hinleong@gmail.com	86356789	no32, Yewtee, Bukit Merch	Medium
3	K2 Trading pte.ltd	k2trading@gmail.com	86345789	no234, Kim Tian Place, Bukit Merch	Good

Figure 6-54 Supplier Records



GetFreshFood

Tom
Store Man ▾

Dashboard Inventory Records Supplier Records **Purchase Orders** Sale Records

Create Purchase Orders

UPC ID:	023456723456
OR	
Product Name:	Orange
Quantity:	6
Add	

List of Products(Order)

ProductName	UPC ID	Quantity	Remove
Orange	023456723456	6	⊗
Milk	012434344343	4	⊗
Bread	012434000012	9	⊗

Place Order

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-55 Create Purchase Orders



GetFreshFood

Tom
Store Man ▾

Dashboard Inventory Records Supplier Records **Purchase Orders** Sale Records

All Purchase Orders



No	Supplier Order ID	Supplier ID	Estimated Delivery	Order Quantity	SKU ID List	UPC ID List	Approve Status
1	SPO0001	SP0001	24-Mar-2021	20	SKU{MDEEEOOqwd92	023456723456	Approve
2	SPO0002	SP0002	25-Mar-2021	20	SKU{MDUUUUUwer323	012434344343	Approve
3	SPO0003	SP0003	25-Mar-2021	35	SKU{MDUEEEEwe345	012434000012	Not Approve

Update

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-56 View All Purchase Orders

The screenshot shows a web-based application for managing food inventory. At the top, there's a green header bar with the logo 'GetFreshFood' and a user profile for 'Tom Store Man'. Below the header, a navigation menu includes 'Dashboard', 'Inventory Records', 'Supplier Records', 'Purchase Orders' (which is underlined, indicating it's the active page), and 'Sale Records'. A search bar labeled 'Search Supplier Order ID' is positioned above a table titled 'Delivered Orders'. The table has columns for 'No.', 'Supplier Order ID', 'Quantity Delivered', 'Delivery Date', and 'SKU ID'. It contains three rows of data:

No.	Supplier Order ID	Quantity Delivered	Delivery Date	SKU ID
1	SPO0001	30	29 - Mar - 2021	SKU{MDEEEOOqwd92}
2	SPO0002	50	30 - Mar - 2021	SKU{MDUUUUUwer323}
3	SPO0003	50	30 - Mar - 2021	SKU{MDUEEEEwe345}

A large green button labeled 'Update' is located on the right side of the table. At the bottom of the page, a small note reads: 'This system is only authorised for use for Get Fresh Foods Employees.'

Figure 6-57 Delivered Purchase Orders

This screenshot shows the 'Sale Records' section of the application. The layout is similar to the previous one, with a green header, navigation menu, and search bar. The 'Sale Records' tab is currently selected. Below the search bar is a table with columns for 'No.', 'SKU ID', 'Quantity Sold', 'Cash Received', 'Amount Received', and 'Discount Applied'. The table contains three rows of data:

No.	SKU ID	Quantity Sold	Cash Received	Amount Received	Discount Applied
1	SKU{MDEEEOOqwd92}	40	2000	20	NA
2	SKU{MDUUUUUwer323}	60	3000	50	10%
3	SKU{MDUEEEEwe345}	50	1000	20	20%

At the bottom of the page, a note reads: 'This system is only authorised for use for Get Fresh Foods Employees.'

Figure 6-58 Sale Records

6.2.2.4 Promoter's Desktop UI

Maintain Product

- Product Information
- Add Damaged/Expired Product

Request Information

- Withdraw Request
- Price Change Request

Maintain Product

Request Information

Product Information

No	SKU ID	Product Name	Description	Expiry Date	Unit Price	Category	Classification	Shelf No	Promotion	Under Weight
1	SKU(MDEEE00qwd92	Orange	Chinese	26-Mar-2021	1	Perishables	Medium	S001	N/A	0.05
2	SKU(MDUEEEEwe345	Milk	Meiji	25-Mar-2021	2.5	Perishables	High	S002	10%	0.08
3	SKU(MDUEEEEwe342	Bread	Milk Bread	30-Mar-2021	2	Perishables	Low Selling	S003	5%	0.002

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-59 Product Information

Maintain Product

Request Information

Add Damaged /Expired Products

Product Information

SKU ID:	SKU(MDEEE00qwd92
Product Name	Orange
Damaged/ Expired	Damaged
Date of Damaged /Expiry	<input type="text"/>

List of Damaged/Expired Products

ProductName	SKU ID	Damaged/E xpired	Date of Damaged/Expired
Orange	SKU(MDEEE00qwd92	Damaged	19/03/21
Apple	SKU(MDUUUUUwer323	Damaged	19/03/21
Milk	SKU(MDUEEEEwe345	Damaged	19/03/21
Bread	SKU(MDUEEEEwe342	Expired	19/03/21

This system is only authorised for use for Get Fresh Foods Employees.

Figure 6-60 Damaged / Expired Products

The screenshot shows the GetFreshFood mobile application interface. At the top, there is a navigation bar with a menu icon, a logo, and a user profile for "Jennifer Promoter". Below the navigation bar, there are two main tabs: "Maintain Product" and "Request Information", with "Request Information" being the active tab. Under "Request Information", there is a sub-tab "Withdraw Request". On the left side of the screen, there is a form for entering withdrawal details. It includes fields for "SKU ID" (containing "SKU(MDEEEOOqwd92)"), "Product Name" (containing "Orange"), and "Withdraw Quantity" (containing "6"). A green "Search" button is located below these fields. On the right side, there are two tables. The first table, titled "Results", shows a single row for an orange with a quantity of 6, a checked status, and an "Add to List" button. The second table, titled "List of Products(Withdraw)", lists oranges, milk, and bread with their respective quantities and remove buttons. A green "Confirm Withdraw" button is located at the bottom right of this section. A small note at the bottom states: "This system is only authorised for use for Get Fresh Foods Employees."

Results			
ProductName	SKU ID	Quantity	Check
Orange	SKU(MDEEEOOqwd92)	6	<input checked="" type="checkbox"/>

List of Products(Withdraw)				
ProductName	SKU ID	Quantity	Remove	
Orange	SKU(MDEEEOOqwd92)	6	<input type="checkbox"/>	
Milk	SKU(MDUUUUUwer323)	4	<input type="checkbox"/>	
Bread	SKU(MDUEEEEwe345)	9	<input type="checkbox"/>	

Figure 6-61 Withdraw Request

The screenshot shows the GetFreshFood mobile application interface. At the top, there is a navigation bar with a menu icon, a logo, and a user profile for "Jennifer Promoter". Below the navigation bar, there are two main tabs: "Maintain Product" and "Request Information", with "Request Information" being the active tab. Under "Request Information", there is a sub-tab "Price Change Request". On the left side of the screen, there is a form for entering price change details. It includes fields for "SKU ID" (containing "SKU(MDEEEOOqwd92)"), "Product Name" (containing "Orange"), "Original Price" (containing "10"), and "Updated Price" (containing "12"). A green "Add" button is located below these fields. On the right side, there is a table titled "List of Products(Price Change)" which lists oranges, milk, and bread with their original and updated prices. A green "Send Request" button is located at the bottom right of this section. A small note at the bottom states: "This system is only authorised for use for Get Fresh Foods Employees."

List of Products(Price Change)					
ProductName	SKU ID	Original Price	Update price	Remove	
Orange	SKU(MDEEEOOqwd92)	10	12	<input type="checkbox"/>	
Milk	SKU(MDUUUUUwer323)	9	5	<input type="checkbox"/>	
Bread	SKU(MDUEEEEwe345)	7	9	<input type="checkbox"/>	

Figure 6-62 Price Change Request

7. Non-Functional Requirement

7.1 System Architectures

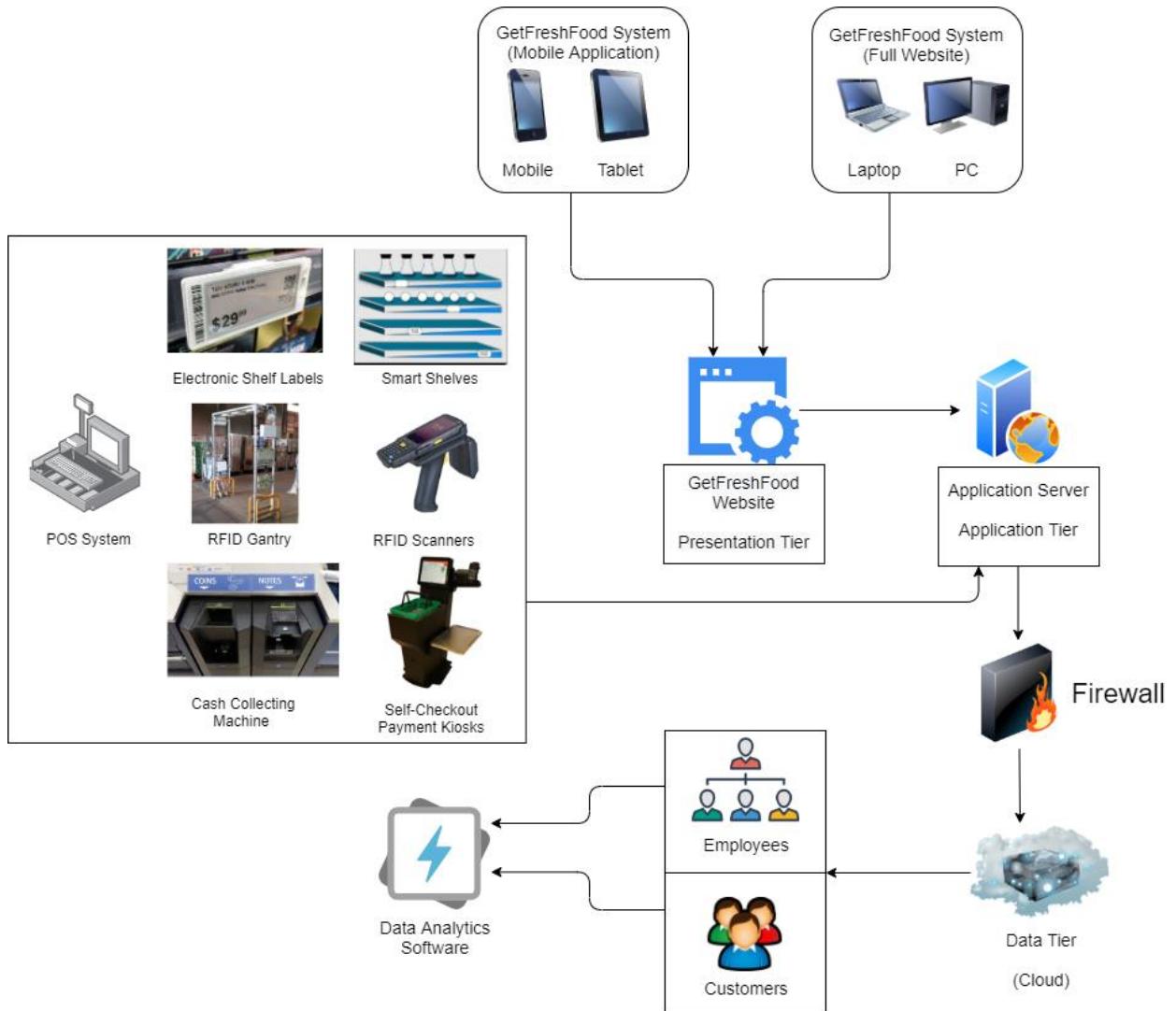


Figure 7-1 System Architectures

7.1.1 Security Advantages of Three-Tier Architecture

In a Three-tier architecture, the application tier acts as a gateway between the presentation tier and the data tier. The presentation tier and data tier cannot communicate directly with each other. This limits user access and provides an additional layer of protection for the database, thus enhancing security. A well-designed application tier also prevents database attacks such as SQL Injections (IBM, 2020).

7.2 System Performance Requirements

The system response time is as the following:

- Normal period – 1sec / screen
- Peak Period 2sec / screen

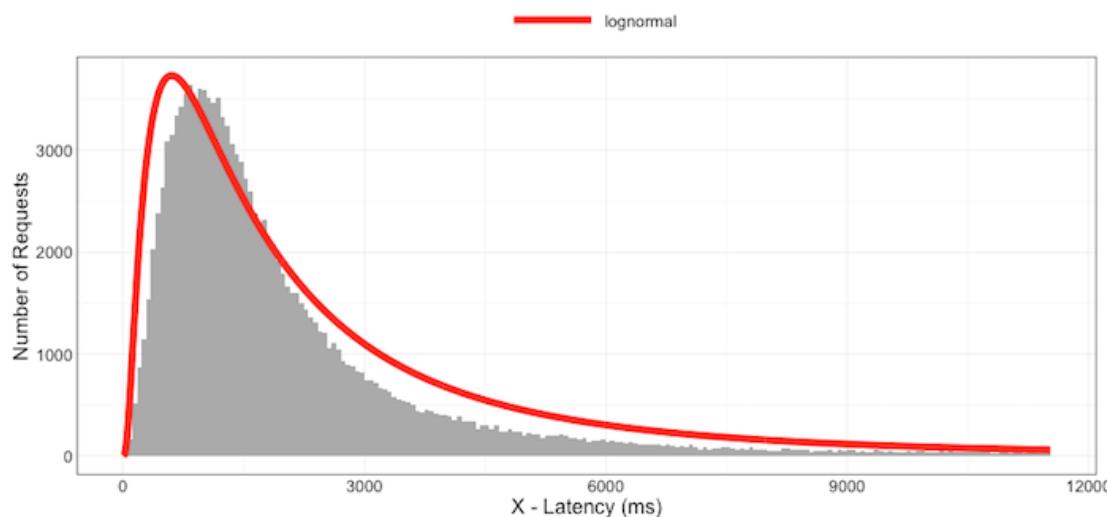


Figure 7-2 Ciemiewicz's Log Normal Distribution (System Response Time) (Kayser, 2017, as cited in Ciemiewicz, 2001)

7.3 System Volume Requirements

7.3.1 User Volume Table

Table 7-1 User Volume Table

User Group	Country/location/count	Remarks
Store Man	Singapore/GetFreshFood Supermarket/24	Store men are stationed at store room and use the system every day. They are not office bound, and they should be able use the system at any location in supermarket.
Cashier	Singapore/GetFreshFood Supermarket/36	Cashiers are stationed at the cash counter and they need to use system every day.
Promoter	Singapore/GetFreshFood Supermarket/120	Promoters are in charge of checking goods on display and sometimes use the system during their shift.

Branch Manager	Singapore/GetFreshFood Supermarket/6	Branch Manager is stationed at the supermarket office and use the system frequently.
Customer	Singapore/Any/Any	Customers make purchases offline and online, and use the system anytime, anywhere.
CEO	Singapore/Office/1	CEO is stationed at his office and rarely uses the System.

7.3.2 Business Transaction Volume Table

Table 7-2 Business Transaction Volume Table

Business Transaction (Use Case)	Business Criticality	No. of Users	Transaction information	Concurrent Important Activities	Assumptions
All Employees					
Log in employee account	Critical	187*	Thrice per day per staff		
Log out employee account	Critical	187	Thrice per day per staff		
Maintain personal details in employee account	Low	187	Twice per year per staff		
Change password in employee account	Low	187	Thrice per year per staff		
Store Man					
Maintain inventory records	Critical	24	**Peak: 4 times per shift per outlet Non-peak: Twice per shift per outlet		
Approve request for stock withdrawal	Critical	24	Peak: 4 times per shift per outlet Non-peak: Twice per shift per outlet		Same numbers as “Promoter – Generate request for stock withdrawal”

Notify supplier for returned products	Moderate	24	Peak: 4 times per week per outlet Non-peak: Twice per week per outlet		
Receive notification of low inventory levels	Critical	24	Thrice per shift per outlet		
Receive notification of damaged products	Critical	24	Peak: 4 times per shift per outlet Non-peak: Twice per shift per outlet		Same numbers as "Promoter – Update damaged products"
Generate request for purchase order	Critical	24	Peak: 4 times per shift per outlet Non-peak: Once per shift per outlet		Same numbers as "Branch Manager – Receive notification of purchase orders"
Track order status	Critical	24	Peak: 4 times per shift per outlet Non-peak: 1 time per shift per outlet		
Receive notification of changes in product classification	Moderate	144	Once per shift per outlet		Branch Manager updates once per shift
Promoter					
Generate request for product price change	Moderate	120	Once per day per outlet		Same numbers as "Branch Manager – Approve request for product price change"
Generate request for stock withdrawal	Critical	120	Peak: 4 times per shift per outlet Non-peak: Twice per shift per outlet		Same numbers as "Store Man – Approve request for stock"

					withdrawal”
Update damaged products	Critical	120	Peak: 4 times per shift per outlet Non-peak: Twice per shift per outlet		Same numbers as “Store Man – Receive notification of damaged products”
Receive notification of misplaced products	Critical	120	Peak: 10 times per shift per outlet Non-peak: 5 times per shift per outlet		
Update smart shelf stock threshold	Moderate	120	Once per day per outlet		
Update product shelf allocation	Moderate	120	Once per day per outlet		
Branch Manager					
Receive notification of purchase orders	Critical	6	Peak: 8 times per day per outlet Non-peak: Twice per day per outlet		Same numbers as “Store man – Generate request for purchase order”
Approve request for purchase orders	Critical	6	Peak: 8 times per day per outlet Non-peak: Twice per day per outlet		Same numbers as “Branch Manager – Receive notification of purchase orders”
Update product information	Critical	6	Twice per day per outlet		
Approve request for product price change	Moderate	6	Once per day per outlet		Same numbers as “Promoter – Generate request for product price change”
Retrieve recommended classification of products	Critical	6	Twice per day per outlet		Once per shift

Assign classification of products	Critical	6	Twice per day per outlet		Once per shift
View end of day sales report	Critical	6	Once per day per outlet		
View weekly sales report	Moderate	6	Once per week per outlet		
View customer feedback	Moderate	6	4 times per week per outlet		
Cashier					
Process refund	Critical	36	Twice per shift per outlet		
Check out products	Critical	36	Peak: 300 times per shift per staff Non-peak: 100 times per shift per staff	Peak: 30 customers per hour Non-peak: 10 customers per hour	Assume 50% of customers need cashier's help to check out
Receive Notification for Unpaid Products	Critical	36	Peak: 6 times per hour per outlet Non-peak: Once per hour per outlet		
Customer					
Log in customer account	Critical	70560***	Peak: Twice per week per customer Non-peak: Once per week per customer	Peak: 2,520 customers per hour Non-peak: 1,260 customers per hour	
Log out customer account	Critical	70560	Peak: Twice per week per customer Non-peak: Once per week per customer	Peak: 2,520 customers per hour Non-peak: 1,260 customers per hour	Same as "log in"
Create customer account	Critical	70560	Peak: 120 customers per day Non-peak: 40 customers per day	Peak: 15 customers/hour Non-peak: 5 customers/hour	
Manage personal details in customer account	Low	70560	5 times per year per customer		

Manage credit/debit card details	Low	70560	Twice per year per customer		
Change password of customer account	Low	70560	Twice per year per customer		
Request for refund	Critical	70560	Peak: 1344 times per day Non-peak: 672 times per day	Peak: 168 customers per hour Non-peak: 84 customers per hour	Assume 10% of online orders gets refunded
Cancel order	Critical	70560	Peak: 1344 times per day Non-peak: 672 times per day	Peak: 168 customers per hour Non-peak: 84 customers per hour	Assume 10% of orders gets cancelled
Receive notification of delivery status	Critical	70560	Peak: 13440 times per day Non-peak: 6720 times per day	Peak: 1680 customers per hour Non-peak: 840 customers per hour	Assume each unique customer shops once a week, i.e. average of $70560/7 = 10080$ per day
Receive notification for confirmed orders	Critical	70560	Peak: 13440 times per day Non-peak: 6720 times per day	Peak: 1680 customers per hour Non-peak: 840 customers per hour	Assumed as same as "Receive notification for delivery status"
Track order status	Critical	70560	Peak: 26880 times per day Non-peak: 13440 times per day	Peak: 3360 customers per hour Non-peak: 1680 customers per hour	Assume two track orders per order
Provide feedback	Low	70560	Peak: 135 times per day Non-peak: 68 times per day	Peak: 17 customers per hour Non-peak: 9 customers per hour	Assume 1% of completed online orders get a feedback

Manage shopping cart	Moderate	70560	Peak: 26880 times per day Non-peak: 13440 times per day	Peak: 3360 customers per hour Non-peak: 1680 customers per hour	Assumed as twice the number of successful checked out orders
Check out shopping cart	Critical	70560	Peak: 13440 times per day Non-peak: 6720 times per day	Peak: 1680 customers per hour Non-peak: 840 customers per hour	Same as "Receive notification for confirmed orders"
View products	Critical	70560	Peak: 53760 times per day Non-peak: 26880 times per day	Peak: 6720 customers per hour Non-peak: 3360 customers per hour	Assumed as twice the number of people who maintain shopping cart
Self-checkout of products at supermarket	Critical	70560	Peak: 300 times per shift per staff Non-peak: 100 times per shift per staff	Peak: 30 customers per hour Non-peak: 10 customers per hour	Assume number of shoppers who self-checked out is similar to online shoppers
Store Man and Promoter					
Receive notification of expiring goods	Critical	144	Peak: 30 times per shift per outlet Non-peak: 5 times per shift per outlet		
Receive notification to replenish shelves	Critical	144	Thrice per shift per outlet		System designed to check once every hour. Not every check will have low inventory levels.
Store Man and Branch Manager					
Maintain supplier records	Moderate	30	Twice a day		
CEO and Branch Manager					

Create new employee account	Low	6	8 times per year per outlet		Based on 25% turnover rate (as stated in interview)
Maintain employee user account	Low	6	Once per month per outlet		
CEO					
View reports	Low	1	20 times per month		

Note:

1. *Where applicable, we have accounted for 6 outlets of GetFreshFood, i.e.
 Number of branch managers = 6
 Number of store men = 24
 Number of promoters = 120
 Number of cashiers = 36
2. **Peak periods include Lunar New Year period, Christmas period, Hari Raya, weekday evenings (5-7pm) and weekend mornings
3. *** On average, 400 sales per shift per staff = $400 * 36 = 14400$ sales per day
 Assume each customer shops once a week, number of unique customers = $14400 * 7 = 100800$. Assume 70% of unique customers have an online account, number of online customers = $0.7 * 100800 = 70560$

7.3.3 Data Transaction Volume Table

Table 7-3 Data Transaction Volume Table

Business Entity Class	Source Document	Retention Period	Target Volume (records)
Inventory Records	Inventory Records	5 years*	<ul style="list-style-type: none"> - 11,561 unique items - Weekly restock, new SKU each restock - 6 branches $5 * 6 * 11,561 * 52 = 18,035,160$
Product Information Records	Inventory Records	5 years	<ul style="list-style-type: none"> - Product information records tracked by RFID ID. Each individual RFID tagged item will have one record. - Assume on average each batch of restock has 50 quantity per unique item $18,035,160 * 50 =$

			901,758,000
Product Movement Records	Nil	5 years	<ul style="list-style-type: none"> - Assume each individual item has average 3 movement records (inclusive of movement into store room/fridge from staging area, and moving into store front) $901,758,000 * 3 = \\ \mathbf{2,705,274,000}$
Employee Profile	Employee Records	5 years	<ul style="list-style-type: none"> - 30 staff, 1 branch manager - 6 branches - 1 CEO - Assume 8 staff changes a year per outlet, based on 25% turnover $31 * 6 + 1 + (5*8*6) = \\ \mathbf{427}$
Employee Shift Details	Employee Shift Records	5 years	<ul style="list-style-type: none"> - 30 staff - 6 branches - Assume store opens everyday with full strength $5 * 6 * 30 * 365 = \\ \mathbf{328,500}$
Employee Movement Details	Nil	5 years	<ul style="list-style-type: none"> Assume average of 10 movement records per staff per day (inclusive of entering shop front, exiting shop front, entering store room, exiting store room, etc) $328,500 * 10 = \\ \mathbf{3,285,000}$
Customer Profile	Nil	7 years**	<ul style="list-style-type: none"> - Assume each customer buys groceries from GetFreshFood once a week - Assume 70% of customers have an account - Based on 14,400 sales per day assumption as per business transaction volume table

			$7 * 14,400 * 7 * 0.7 =$ 493,920
Credit Card Details	Nil	7 years	- Assume 90% of customers with profiles will leave credit card details $0.9 * 493,920 =$ 444,528
Sales Records	End of Day sales Reports	7 years***	- Assuming 14,400 sales per day per branch $7 * 14,400 * 365 =$ 36,792,000
Supplier Profile	Store Man Mobile Records	5 years from last order from supplier	- Assuming 1 supplier provides 10 unique items - Assuming each unique item has 4 suppliers $(11,561 / 10) * 5 * 4 =$ 23,122
Records of Disposal	TriPLICATE Return Forms	5 years	- Assuming items from 10 SKU are disposed a day - 6 branches $5 * 6 * 10 * 365 =$ 109,500
Expired/Damaged Products Records	TriPLICATE Return Forms	5 years	- Assuming items from 10 SKU are damaged/expired a day - 6 branches $5 * 6 * 10 * 365 =$ 109,500
Customer Order Details	Nil	7 years	- Assume customers place order once every week $7 * 70,560 * 52 =$ 25,683,840
Customer Feedback Records	Nil	5 years	- Assume 1% of buyers leave feedback $5 * 70,560 * 52 * 0.01 =$ 183,456
Shopping Cart	Nil	5 years	- Assuming 5 people a day don't complete purchase $5 * 5 * 365 =$ 9,125

Refunds Records	Refund Records	5 years	- Assuming 24 refunds a day, as per business transaction volume table $5 * 24 * 365 =$ 43,800
Approval Status of Purchase Orders	Delivery Orders	7 years	- Assume 1,156 suppliers excluding backup (as above) - Assume average weekly restock, i.e. order from each supplier once every week - 6 outlets $7 * 6 * 1,156 * 52 =$ 2,524,704
Purchase Order Records:	Delivery Orders	7 years	- Assuming each PO contains 10 unique items $10 * 2,524,704 =$ 25,247,040
Delivery Order Records	Delivery Orders	7 years	- Assuming each PO takes on average 1.5 deliveries $1.5 * 2,524,704 =$ 3,787,056
Price History Records	Product Form	7 years	- Assuming 50 price changes a day $7 * 50 * 365 =$ 127,750
Shelves Information	Store Shelf Documentation	While SKU is still on the shelf	- Each SKU ID has its own record - Assuming there are 5 batches of a unique item on the shelves at the same time on average - 6 branches $6 * 11,561 * 5 =$ 346,830

Note:

1. * 5 years retention period for records as required based on Singapore laws (Singapore Legal Advice, 2020)
2. ** 7 years retention period for customer info as we want customers to feel welcomed by still keeping their account even if they have not used it for a few years
3. *** Other records being kept for 7 years represent information that are more suitable for being analyzed

7.4 System Security Requirement (From Data Point of View)

Table 7-4 System Security Requirement (From Data Point of View)

Data Entity	Actor					
	CEO	Branch Manager	Store Man	Promoter	Cashier	Customer
Inventory Records	R	C, R, U, D	C, R, U, D			
Product Information Records	R	C, R, U, D	C, R, U, D	R		
Employee Profile	C, R, U, D	C, R, U, D	R, U	R, U	R, U	
Employee Shift Details	R	C, R, U, D	R	R	R	
Customer Profile	R	R				C, R, U, D
Credit Card Details						C, R, U, D
Sales Record	R	R, U, D	R		C, R, U, D	
Customer Order Details	R	R	R			R
Records of Disposal	R	C, R, U, D	C, R, U, D			
Expired / Damaged Products Records	R	R	C, R, U, D	C, R, U, D		
Customer Feedback Records	R	R				C, R, U, D
Shopping Cart						C, R, U, D
Refund Records	R	R			C, R, U, D	C, R, U, D
Purchase Orders Records	R	R	C, R, U, D			
Delivery Order Records	R	R, U	C, R, U, D			
Price History Records	R	R, U, D		R		
Shelves Information	R	C, R, U, D	R	R		

Supplier profile	R	C, R, U, D	C, R, U, D			
Approval Status of Purchase Orders	R	R, U	C, R, U, D			
Product Movement Records	R	R	R			
Employee Movement Records	R	R				

7.5 System Security Requirement (From Use Case Point of View)

Table 7-5 System Security Requirement (From Use Case Point of View)

Use Case	Actor					
	CEO	Branch Manager	Store Man	Promoter	Cashier	Customer
View reports	x					
Log in employee account	x	x	x	x	x	
Log in customer account						x
Log out employee account	x	x	x	x	x	
Log out customer account						x
Manage personal details in employee account	x	x	x	x	x	
Change password in employee	x	x	x	x	x	

account						
Receive notification of purchase order		X				
Create new employee account	X	X (Main user)				
Approve request for purchase orders		X				
Maintain employee user accounts	X	X (Main user)				
Update product information		X				
Approve request for product price change		X				
Retrieve recommended classification of products		X				
Assign Classification of Products		X				
Maintain supplier records		X	X (Main user)			
View End-Of-Day sales report	X	X (Main user)				
View weekly sales report	X	X (Main)				

		user)				
View customer feedback	X	X (Main user)				
Generate request for product price changes				X		
Receive notification on expiring goods			X	X		
Receive notification to replenish shelves			X	X		
Generate request for stock withdrawal				X		
Receive notification of changes in product classification			X	X		
Update damaged products	X	X	X (Main user)	X		
Maintain inventory records		X	X (Main user)			
Approve request for stock withdrawal			X			
Notify suppliers for returned products			X			

Receive notification of low inventory levels			X			
Generate request for purchase order			X			
Track order status			X			
Receive notification of misplaced products			X			
Update smart shelf stock threshold			X			
Update product shelf allocation			X			
Receive notification of damaged products			X	X		
Process refund					X	
Checkout of product					X	
Receive notification of unpaid products					X	
Manage credit/debit card details						X
Request for refund						X
Cancel order						X

Receive notification of delivery status						X
Receive notification of confirmed orders						X
Track order status						X
Provide feedback						X
Manage shopping court						X
Checkout shopping cart						X
View products						X
Self-checkout of products						X
Create customer account						X
Manage personal details in customer account						X
Change password in customer account						X

7.6 Reliability Requirements

7.6.1 Operation Time

- Store Men, Promoters, Cashiers – 24/7
- CEO – 24/7

- Customer – 24/7
- Operation down time can occur from 11:00pm to 07:00am in case of a need for a big update/upgrade
- Not more than 5 minutes of down time

7.6.2 Hardware Failure

- Recovery duration – not more than 30 minutes.
- Machine operations can cease during failure as there are other function machines.

7.6.3 Disaster Recovery

- Server operations will perform a virtual machine migration which is supported by another physical server as a host in case of a server failure.
- Data currency on physical server – one hour back.

8. References

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