

PROJECT REPORT

Team 3:
Shaheen Nazar
Madhavi Ranganadha
Pallavi Saboo
Ankitha Shetty

Rainbow Grocery Store

Smart cart Implementation



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PROJECT CASE

Rainbow grocery store conducted customer surveys to understand the issues faced by the shoppers. They found that long checkout queues, unknown aisle location where product is placed and lack of information on ongoing promotions and deals were major issues faced by the customers. While shopping consumers have other problems as well, like worrying whether the amount of money brought is sufficient or not, incomplete information about the products in store. Other than this they have to select the best product out of thousands of products. These issues result not only in bad customer experience but also loss of sales. Also, because of the high operating costs of the payment transactions and automated check-out systems the supermarket bears tremendous costs which reduce the profits in turn.

Rainbow grocery outlet plans to implement smart cart technology in the store which will address all the above-mentioned problems faced by the customer during shopping and checkouts leading to satisfied customers and hence increased profit. We expect that the smart cart system will increase sales by enabling existing customers to easily place more orders and help to reach new customers.



As soon as a customer enters the grocery store, he picks a smart cart that asks the user to login. Customers have the option to flash their member card or use membership card number and password to log into the system. Customers who do not have a membership account with the retailer would be asked to sign up or register . Once a user creates an account by entering his/her details, a membership number is assigned to the user. Customer information is stored in the customer data store. After authentication, customers' shopping list would be stored by

the app/cart for the duration of the shopping trip. Users can enter a shopping list i.e. the quantity and items they plan to buy using the shopping list tab on the application. Shopping list is stored in the customer data store. System should also display features like “routing paths”, “deals of the day” on the screen along with a search keyword feature to the customer and products catalog is displayed by extracting information from the item data store. The item data store contains information on items including details, price, images, descriptions, deals and location. This data store is contained within the system. Customers can search for the specific product they are looking for or they can locate a department by looking at the map feature and pinching/zooming in for additional detail.

User searches for an item he intends to purchase. The item the user is looking for is checked using the inventory data store to ensure that Rainbow grocery has sufficient inventory or if the item is out of stock. If an item is out of stock, a notification is sent to the inventory manager and the user is notified that the current item is not available. User is redirected to the items catalog. If an item, the user is looking for is available the application returns aisle number where the product is stored along with the shortest path to reach that aisle location. The customer uses the map feature to reach the aisle location. Throughout the shopping session customers will receive notifications about offers in store. Product offers and deals in nearby aisles will be displayed to customers while he/she is moving from section to section. Once a customer decides to purchase a product, he/she can scan the barcode and put the item in the cart. Each item will have an RFID tag and each cart will have an RFID reader. It will also provide anti-theft system for the grocery outlet. The store uses a centralized database system. Pressure/Weight sensors will be used to detect the presence of new items in the cart. System will extract the barcode number scanned using the barcode. Using the barcode number system will fetch product details from the item data store and display the details to the user for review

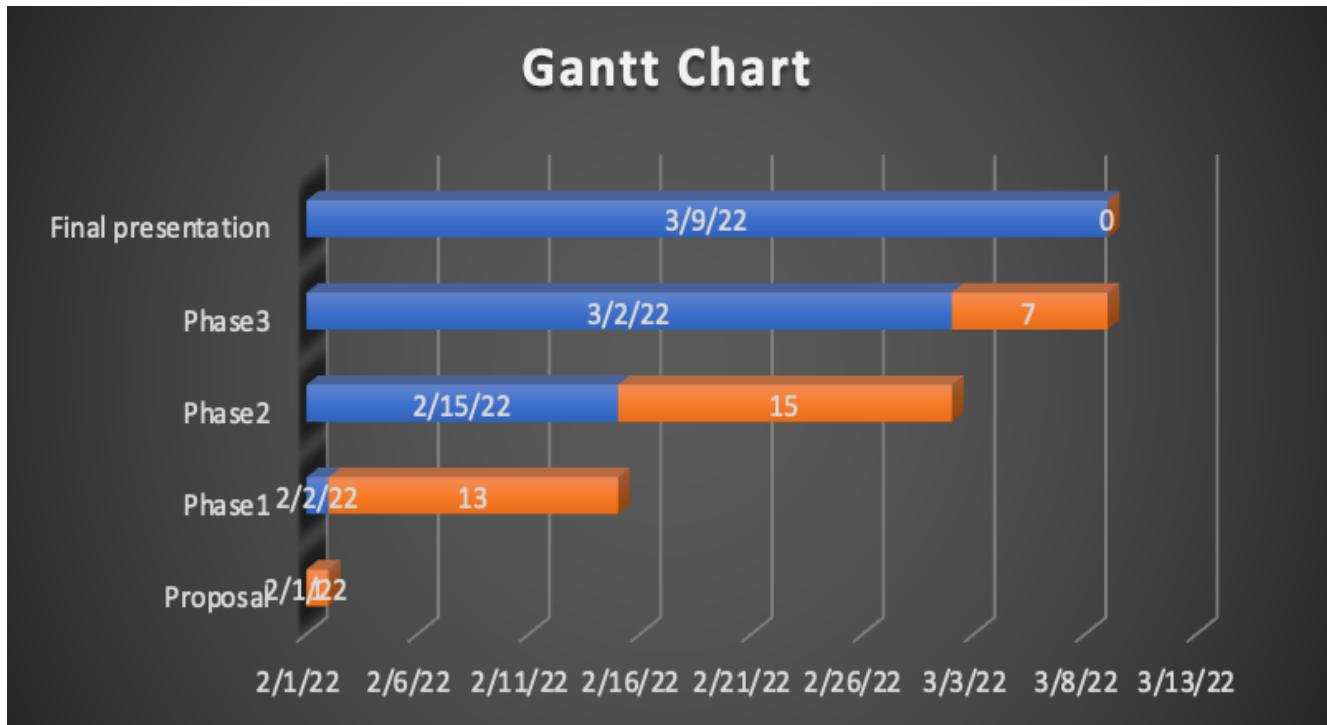
and confirmation on the LCD screen. The smart cart has a foldable weighing scale attached to it to measure food items sold by weight. Once the shopper enters the weight of the item, the system calculates the cost of the product. While purchasing the products, customers can add and remove items from the cart. New items in the cart will be detected by tracking the change in the output of pressure sensors. The same sensors will be used to detect when items are removed from the cart and notify the shopper if certain items have not been scanned. Therefore, if the sensor shows a weight change of 10lbs. and the products scanned only total up to 8lbs., the shopper will be notified immediately about the discrepancy. Similarly, if items are removed, the sensor will notify the shopper. If the cart cannot confirm what was removed, the shopper will be prompted with a “Multi-Match Removal” screen to manually choose what was removed from the cart. Items can be removed directly from the cart. The cart uses computer vision and weight logic to determine what has been taken out of the cart. If the cart is unable to determine what has been removed, then the user would be asked to manually remove the item. Items can also be removed by first tapping on the trash can icon next to the item name on your shopping list. Shoppers will be prompted to take the item out of your cart. Cart will use its computer vision and weight logic to confirm removal of the item. The item will automatically be removed from the shopping list created by the customer. Once, user is done shopping, he can walk towards the exit or payment terminal.

As soon as the user reaches a certain distance to the payment terminal and if an item on the shopping list is not on the cart the app notifies the customer that some of his shopping list items have not been added. As soon as the cart reaches a certain distance to the payment terminal the cart would transmit all the info related to the payment i.e. price, quantity, item list. Once a user confirms the purchase, shoppers can view coupon offers or loyalty points the customer has from the customer data store. If a user decides to use loyalty points or coupon offers, then the order total is recalculated. Then the user could go ahead with the payment process and could pay by card. Payment is validated and processed by a credit card clearinghouse. When payment has been approved by the clearinghouse, the order is finalized and recorded in the order data store and the customer is provided an order receipt. Inventory is updated to reflect the inventory data store and customer information is recorded in customer data store. Customers bag their own items using store bags or reusable bags they bring with them. In this way the customer could carry out a simple and faster check out.

The customer can click on the help button on the application to receive in store help. A grocery store representative would show up to help the user. A program will be implemented to confirm the removal from the shopper's shopping cart. Another program will be implemented to work as an anti-theft mechanism to prevent the shopper from leaving without a successful payment. When the cart reaches a certain distance to the in-store component and if there is any discrepancy between the weight of the cart and the weight of the scanned items, the alarm system would trigger.

GANTT CHART

Work Plan showing tasks that need to be completed by your team via a Gantt Chart:



SYSTEM REQUEST

Business/Organization: Rainbow Groceries Ltd.

Rainbow grocery outlet engages in the retailing business of natural and organic foods. The grocery store is an independent grocery store (40,000 sq feet), which offers the widest selection of organic and locally sourced products at the most affordable price. We are also a resource for our community to exchange information about the health and sustainability of the foods we eat. The company's products include beverages, body care, snacks, frozen, pantry staples, supplements and gift baskets and eco-scaling cleaning products.

System Request – Rainbow grocery Ltd smart cart implementation

Project sponsor: Rainbow grocery outlet owner.

Business Need:

According to market research, one of the major factors influencing consumer's choice of retail food store is shopping convenience. General issues faced by the customer while retail shopping are long checkout queues, unknown aisle location where product is placed and lack of information on ongoing promotions and deals. Also, because of the high operating costs of the payment transactions and automated check-out systems the supermarket must bear tremendous costs which reduce the profits in turn.

This project has been initiated to increase sales of Rainbow grocery outlets by implementing smart cart technology in the store which will address all the above-mentioned problems faced by the customer during shopping and checkouts leading to satisfied customers and hence increased profit.

Business Requirements:

Using this system, customers will be able to search for and purchase desired items in desired quantity from the Rainbow grocery outlet. The focus of the system is to enhance customer convenience while shopping.

The specific functionality that system should have includes the following:

- Search, add or remove items through catalog.
- Display user, shopping list recommendations and promotional offers in store.
- Provide capabilities for navigation to product isle.
- Scan products, use built in scale for items sold by weight.
- Allow display of instant addition of items in the cart.
- Instant payment for the total items in the cart.
- Allow shoppers to bag purchased items and exit the store.
- Update and maintain datastores involved during the whole process.

Business value:

We expect that the smart cart system will increase sales by enabling existing customers to easily place more orders and help to reach new customers.

Intangible value addition

- 40% improvement in customer experience by not having the users to wait in the queue for checkout.
- Providing a sense of empowerment to customers by allowing them to engage at their own pace with their choice to make their own decisions. It will increase the product lifetime value by offering a unique experience as well.
- Cart will provide way-finding capabilities that will help locate the item the customer is looking for thereby enhancing customer satisfaction while shopping.
- Smart cart set up will help the store with better human resource allocation for other value-added tasks in the store.
- Reduction in human error during checkout.
- Up-to-date purchase, inventory and vendor management with the real time information provided from the Smart Cart.

Tangible value addition

- 12% increase in sales due to real time display of the information about shopping list recommendations, promotional offers, coupons, and discounts in the store.
- Reduction in investment on other payment systems leading to 10 % increase in profit.
- 4% increase in store revenue by monetizing ads and promotions displayed on the app.

Special Issues or Constraints:

- Frequent inventory stock outs should be prevented, and the system should be efficient enough to inform inventory managers in advance regarding the items going low in stock.
- Supplier delays or any concern related to Supplier should be resolved as soon as possible.

FUNCTIONAL REQUIREMENTS

Process Requirements

1. Login or register:

- 1.1 System displays the registration page when a user clicks on the register button on the login page.
- 1.2 System should allow the user to enter his/her details for instance Name, Last Name, Address, Date of Birth, email, Phone number, Username and Password while registering.
- 1.3 If registration is successful, the system should display a successful registration message to the user.
- 1.4 System should store the new user login details in the customer data store
- 1.5 System should allow registered users to login using their username and password. System should fetch already registered user's login information from the customer data store.
- 1.6 System should display an error message if incorrect login details are entered by the user.
- 1.7 System should allow user to re-enter username and password after error message is displayed

2. Search & Browse:

- 2.1 After login, the system should display the main page displaying features like routing path, deals, shopping list and products catalog.
- 2.2 If the user has already created a shopping list, the user can access the list via the shopping list tab on the screen.
- 2.3 System will also enable customers to browse through the product catalog by preferred categories of product.
- 2.4 System will display each item's title, description, image, location, route, price, and deals (if any exist)
- 2.5 When a customer searches for a particular item, and if it is out of stock, notification is sent to Inventory manager and the customer is notified about its status.

3. Reach Product/Item location

- 3.1 System should display the aisle number and route to the product aisle on which the product is currently placed.
- 3.2 System should allow zooming in and out to understand the product location better.
- 3.3 While the user starts navigating towards the desired product aisle, "deals of the day" and store offers on nearby aisle will be prompted on the screen.
- 3.4 If the User wants to shop according to a particular department and enters that into the system, the system should display the route to that department.

4. Add item to the cart

- 4.1 System should extract the barcode number when an item is scanned.

4.2 System should extract product details and display the details of that product using the barcode number and if there is a deal/offer going on that product, it's automatically applied by the system.

4.3 System should enable the user to add the scanned product into the physical cart.

4.4 For items sold by weight, the system should allow the user to enter the item he/she is weighing for purchase.

4.5 The system should allow users to weigh the item on a foldable weighing scale present in the cart.

4.6 Once the item is weighed by the weighing scale, the system should display the cost of the product on the screen accordingly.

5. Remove Items from the cart

5.1 System should be able to detect if an item is removed from the cart using cameras, weight logic and pressure sensor.

5.2 Once the system detects which item was removed from the physical cart, the system removes it from the purchased items on the screen as well and prompts the user about the item's removal from the cart.

5.3 If the system is unable to detect which item was removed from the cart, the system should ask the user to manually remove it from the on-screen cart.

5.4 System should remove the item from the screen cart if the user clicks on the trash icon next to the item icon.

5.5 System prompts the user to save the items in the cart once the item has been removed from the screen cart.

6. Calculate the order total

6.1 User clicks on the proceed to checkout

6.2 System should allow users to apply valid coupon codes if available.

6.3 System should allow users to view and apply loyalty points if they have any.

6.4 After applying the loyalty points system and valid coupon code , System should recalculate the order total.

6.5 Once the loyalty points have been used, the system should update the loyalty points in the customer data store accordingly.

7.Checkout

7.1 Once the customer clicks the checkout button, the system tallies the items in the shopping list and the cart and if the product in the shopping list is not present in the cart, the customer is prompted for if he/she wants to add that item in the cart.

7.2 If a customer clicks the No button, the system asks the customer for their credit card details if there are no saved ones.

7.3 System uses a clearinghouse as the payment service to validate and authorize the payments.

7.3 System prompts the payment status to the customer.

7.4 After payment approval, the system allows record customer order details in the order data store.

7.5 Customer card details are saved in the Customer data store if the customer agrees to save it in the system.

7.6 Customers are provided with an order receipt and are prompted to log out of the system.

8.System updates

- 8.1 System will update the item data store after a customer purchase and a notification is sent to the inventory manager regarding the item counts available in the store.
- 8.2 System sends “item low stock” notification to Inventory manager if the item count in the store is less than 5 to make sure that the item getting low in stock can be delivered to the store in time.
- 8.3 If the item count goes down to 0 after a purchase in a particular store, the system sends notification to store manager and Inventory manager.
- 8.4 System will allow the inventory manager to directly update the item data store to reflect the current count of the item in the physical inventory.
- 8.5 If the item is available in the inventory, Inventory manager delivers the items to the store manager who puts the item back on the shelves.

Information Requirements

- The system must remain updated with all the product information available for sale.
- The system must display all the items available in the store along with the deals/promotions going on them (if applicable)
- The system must display navigating routes to the aisle where the item is currently present.
- The system must include real-time inventory levels in every store inventory all the time.
- The system must store all the payment information, including payment history for 3 years.
- The system must retain customer details like name, address, and order history for 3 years.

NON - FUNCTIONAL REQUIREMENTS

Operational

- The system should be user friendly in terms of User accessibility.
- The system should be able to run on every cart in the store.
- The system should facilitate search by item name, item number.
- The system should facilitate smooth and error free operation of all the features on the cart like Barcode reader, folding weighing scale, RFID reader and weight sensor.
- System should support different accessibility features like accessible images, menus, and effective use of color to make it user friendly for people with disabilities.

Performance

- The system should run smoothly without any glitches or errors in store operating hours all the time.
- At least 1000 users should be able to access the system concurrently.
- Page load time for the system should be under 2 sec.
- The system should be able to scale up based on the number of users accessing the system which means it should not crash if the number of users is more than expected.
- Images of the items used by the system should be optimized, making the system 10 % faster.

Security

- Only the authorized users who have an account with Rainbow store should be able to access the system.
- System should have all available safeguards from security attacks like viruses, worms, or hacking.
- System should be able to respond to critical system failures.
- Access permission to system information should be handled by only the data administrator.
- Customer information should be confidential, and the Payment gateway used by the system should be encrypted and secure.

Cultural/political

- Payment system used by the system should be able to support currencies of countries across the world.
- The system should be able to support a multilingual customer base.
- The system should not display any religious symbols or words associated with mainstream religion.
- System should be compliant with government regulations of the state.
- System should include the company's standard logo and color scheme.

USE CASES

Use Case Name: Login a user or register new user	ID: UC-1	Priority: High
Brief Description: This use case describes a Rainbow Grocery outlet customer wants to register their name and information to the website or a user with an existing account wants to login into the Rainbow Grocery outlet website		
Actor: Registered Customer or New Customer		
Trigger: Customer wants to purchase items from the grocery outlet and tries to login into the system or register information through a screen mounted on a shopping cart.		
Type: <u>External</u> / Temporal		
Preconditions: <ol style="list-style-type: none"> 1. Rainbow Grocery Inc. website should be up and running. 2. Customers have access to a shopping cart. 3. Shopping cart has screen mounted to it and has a working internet connection to access the store website. 4. Scanner and weighing scale mounted on the cart should be working. 5. Customer must be registered to login into system. 6. Customer has access to the login/register page 		
Normal Course: Customer tries to login or register their information into the grocery outlet website: <ol style="list-style-type: none"> 1. If a customer doesn't have an account with the grocery store, customers add their information by clicking on the register button. 2. Customer fills in the information and clicks on submit button 3. System stores customer details in the customer data store and processes for errors or duplicates. 4. Customer enters username and password to log in to the website 5. System extracts the username and password from customer data store and verifies details 6. If login details entered are correct, the system displays the home page displaying product catalog 7. If login details are incorrect the system asks user to reenter the username and password and goes to step 5. 	Information for Steps <ul style="list-style-type: none"> 1. Customer Info 2. Filled Information 3. Storing and validating Customer Info 4. Customer login info 5. Customer login info verification 6. Product catalog 7. Home page display 8. Re-enter customer login info 	

Alternative Course(s):																													
1.1 Previous Registration <ul style="list-style-type: none"> 1. This could happen by the user already registered and wanting to become a new user. The user must either update or delete old information. 																													
Post conditions: <ul style="list-style-type: none"> 1. Customers are notified that they have successfully registered. 2. Customer is taken to the product catalog page where user can browse and shop products 																													
Exceptions: <p>E1: The internet connection goes down (Occurs at step 1)</p> <ol style="list-style-type: none"> 1. System displays the message “No internet connection” to the user. <p>E2: Invalid User Input:</p> <ol style="list-style-type: none"> 1. This occurs when the user inputs invalid username or password. The user will be prompted for correct information. 																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Summary Inputs</th><th style="text-align: left;">Source</th><th style="text-align: left;">Outputs</th><th style="text-align: left;">Destination</th></tr> </thead> <tbody> <tr> <td>Customer Info</td><td>Customer</td><td>Storing and validating Customer Info</td><td>Customer Data Store</td></tr> <tr> <td>Filled Information</td><td>Customer</td><td>Customer login info verification</td><td>Item Data Store</td></tr> <tr> <td>Customer Information</td><td>Customer</td><td>Home page display</td><td>Customer</td></tr> <tr> <td>Customer login Info</td><td>Customer</td><td></td><td></td></tr> <tr> <td>Product catalog</td><td>Item Data Store</td><td></td><td></td></tr> <tr> <td>Re-enter customer login info</td><td>Customer</td><td></td><td></td></tr> </tbody> </table>		Summary Inputs	Source	Outputs	Destination	Customer Info	Customer	Storing and validating Customer Info	Customer Data Store	Filled Information	Customer	Customer login info verification	Item Data Store	Customer Information	Customer	Home page display	Customer	Customer login Info	Customer			Product catalog	Item Data Store			Re-enter customer login info	Customer		
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Use Case Name: Search & Browse	ID: UC-2	Priority: High
Brief Description: This use case describes a Rainbow grocery outlet customer who searches and browses grocery products.		
Actor: Customer		

Trigger: Customer wants to purchase items from Rainbow Grocery Outlet and logs in to the website to search for products.

Type: External / Temporal

Preconditions:

1. Rainbow grocery outlet website should be up and running.
2. Customers have access to a shopping cart.
3. Shopping cart has a screen mounted to it and has a working internet connection to access the store website.
4. Scanner and weighing scale mounted on the cart should be working.
5. Customer has successfully logged into the system
6. Item database should be up to date.

Normal Course:

Customer browses the website and selects the desired products

- | | |
|--|---------------------------------|
| 1. System displays main page displaying features like routing path, deals, shopping list & product catalog | Features & List of Items |
| 2. System should allow user to create a wishlist list | wishlist list creation |
| 3. System should allow user to view wishlist list | View wish list items |
| 4. User enters keyword into search text field for item of interest | Search item |
| 5. If product is not available, system notifies user and user is redirected to homepage | User notification |
| 6. If a product is available, information about the product is displayed to the user including the option to add an item to the shopping cart. | Product info
Product details |

Alternative Course(s):

1.1 Blank Search field

1. Happens when a user has forgotten to enter a keyword to search by. The blank search field will in turn return all products/categories

Post conditions:

1. A searchable list of items has been returned to the user in terms of relevancy to the search they performed.

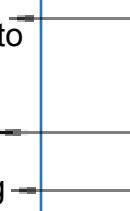
Exceptions:

E1: The internet connection goes down (Occurs at step 1)

1. System displays the message "No internet connection" to the user.

Summary Inputs	Source	Outputs	Destination
Features & List of Items	Item Data store	User notification	Customer

Wishlist list creation	Customer		Customer
Search item	Customer	Product Info	Customer
Product details	Item Data store	View Wishlist items	Customer

Use Case Name: Reach product/Item location	ID: UC-3	Priority: High
Brief Description: This use case describes how a Rainbow grocery outlet customer fetches product location information from the system and reaches where it is placed.		
Actor: Customer		
Trigger: Customer taps on the Location icon present beside every searched product list displayed by the system.		
Type: <u>External</u> / Temporal		
Preconditions: <ol style="list-style-type: none"> 1. Rainbow grocery outlet website should be up and running. 2. Customers have access to a shopping cart. 3. Shopping cart has a screen mounted to it and has a working internet connection to access the store website. 4. Scanner and weighing scale mounted on the cart should be working. 5. Customer has successfully logged into the system 6. Item database should be up to date. 7. A searchable list of items has been returned to the user in terms of relevancy to the search they performed. 		
Normal Course: Customer fetches the location information of the item which he/she wants to buy and reaches the place where the item is placed.		Information for Steps
<ol style="list-style-type: none"> 1. Customer selects the item by tapping on it from the list of items fetched by the system according to the search result. 2. System displays selected item features like item name, type, price , location and deals if any. 3. Customer clicks on the location icon shown along with other item details. 		

4. System displays the item routing path and aisle number where the product is placed	Routing path Aisle number
5. System allows users to zoom in and zoom out by pinching in and out on the display screen to understand the product location better.	Product info Image feature
6. Customers start navigating towards the desired product aisle, “Deals of the day” and “Store Offers” on the nearby aisle will be popping on the screen.	Routing path Deals/Offers
7. If the customer wants to shop in a particular department, the system displays the route to that department once the customer enters the department name in the system.	Department Name Department location

Post conditions:

- Customer reaches the product aisle and location where the desired item/items are present.

Exceptions:

E1: The internet connection goes down (at any point of time during the purchase)

- System displays the message “No internet connection” to the user.

E2: The system fails to display the routing path of the product once the customer taps on the location icon.

- System displays the message “Currently not able to fetch the product location, please try once again”

Summary Inputs	Source	Outputs	Destination
Item selection	Customer	Routing path	Customer
Item details	Item Data store	Aisle number	Customer
Location icon click	Customer	Department Location	Customer
Product info Image feature	Item Data store	Routing path Deals/Offers	Customer
Department Name	Item Data store		

Use Case Name: Add Item to the cart	ID: UC-4	Priority: High
Brief Description: This use case describes how a Rainbow grocery outlet customer adds desired items to the cart.		
Actor: Customer		
Trigger: Customer decides what to buy and starts adding the item to the cart Type: <u>External</u> / Temporal		
Preconditions: <ol style="list-style-type: none"> 1. Rainbow grocery outlet website should be up and running. 2. Customers have access to a shopping cart. 3. Shopping cart has a screen mounted to it and has a working internet connection to access the store website. 4. Scanner and weighing scale mounted on the cart should be working. 5. Customer has successfully logged into the system 6. Item database should be up to date. 7. Customer reaches the product aisle and location where the desired item/items are present. 		
Normal Course: Customer starts adding the desired item/items in the cart by scanning it.		Information for Steps
<ol style="list-style-type: none"> 1. Customer scans each item barcode through the RFID reader installed on the cart before adding it to the physical cart. 2. System displays scanned item features like item name, quantity, deals (if any), and price according to the barcode fetched by the RFID reader. 3. Customer adds scanned products/items to the physical cart 4. For items sold by weight, the customer enters the item name in the search bar and the system fetches the item information. 5. Customer selects the desired item from the list of searched items. 		Item scanning Scanned item info Display scanned Info Item addition Item information Select items Message for User

6. System asks the customer to weigh the item on the foldable weighing scale present in the cart.	Weighed item addition
7. Customer weighs the item and the system records the information.	Display Item info
8. System displays the weighted item information on the screen	

Post conditions:

- Customer adds all the items in the cart which he/she intends to purchase.

Exceptions:

E1: The internet connection goes down (at any point of time during the purchase)

- System displays the message "No internet connection" to the user.

E2: The system fails to detect the barcode information to be scanned by the RFID.

- System displays the message "Scan the item once again"

Summary Inputs	Source	Outputs	Destination
Item scanning	Customer	Display scanned info	Customer
Scanned item info	Item Data store	Item addition	Cart Data store
Item Information	Item Data store	Message for user	Customer
Select items	Customer		
Weighed item addition	Customer	Display item info	Customer

Use Case Name: Remove Items from the cart	ID: UC-5	Priority: High
Brief Description: This use case describes how Rainbow grocery outlet system responds when an item is removed from cart.		
Actor: Customer		
Trigger: Customer removes items from cart that he now does not require.		
Type: <u>External</u> /Temporal		
Preconditions:		
<ol style="list-style-type: none"> Rainbow grocery outlet website should be up and running. Customers have access to a shopping cart. Shopping cart has a screen mounted to it and has a working internet connection to access the store website. 		

4. Scanner and weighing scale mounted on the cart should be working.
5. Customer has successfully logged into the system
6. Item database should be up to date.
7. Cart database should be up to date.
8. Customer adds all the items in the cart which he/she intends to purchase.

Normal Course:	Information for Steps
1. Customer removes item from the cart	Item weight and price
2. System prompts user confirmation about item removal; customer can approve or reject the request	Removal status
3. System removes item from the cart once the customer approves the change and the updated cart is shown to the customer.	Update cart items

Alternative Course(s):

If the pressure sensors do not detect the item weight and remove it from cart, then it can be done manually:

1. Click on the trash can icon besides the item; system will request confirmation of item removal
2. Once the user confirms then the item will be removed from the cart and the user is presented with the final cart details

Post conditions:

1. The cart will have all the final items the customer wants to purchase.

Exceptions:

E1: The system is unable to delete an item from the cart.

1. show the customer the message that is unable to delete the item. Please try again or call help

Summary Inputs	Source	Outputs	Destination
Item weight and price	Cart Data store	Update Cart items	Cart Data store
Removal Status	Customer		

Use Case Name: Calculate cart total	ID: UC-6	Priority: High
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Brief Description: This use case describes how Rainbow grocery outlet system calculates order total.

Actor: System

Trigger: Customer has all the required items in the cart and clicks proceed to checkout.

Type: External/Temporal

Preconditions:

1. Rainbow grocery outlet website should be up and running.
2. Customers have access to a shopping cart.
3. Shopping cart has a screen mounted to it and has a working internet connection to access the store website.
4. Scanner and weighing scale mounted on the cart should be working.
5. Customer has successfully logged into the system
6. Order database should be up to date.
7. Cart database should be up to date.
8. The cart will have all the final items the customer wants to purchase.

Normal Course:	Information for Steps
1. System displays valid coupons available for the customer.	Valid coupons
2. Customer chooses a coupon from the list to apply.	Selected coupon
3. Show customer his accumulated loyalty points and collect his response if he wants to apply the loyalty points to the order	Loyalty Points Redeem Loyalty
4. Calculate order total by subtracting the coupon discount and loyalty points and display the total to the user.	Cart total

Post conditions:

1. The cart total will be displayed to the customer.

Exceptions:

E1: If a coupon applied by the customer is not valid.

1. System displays message "invalid coupon" to the user.

Summary Inputs	Source	Outputs	Destination
Selected coupon	Customer	Valid coupons	Item Data store
Redeem Loyalty	Customer	Loyalty Points Cart total	Customer Data store Cart Data store

Use Case Name: Check Out	ID: UC-7	Priority: High
Brief Description: The use case describes about the process during check out		
Actor: System		
Trigger: Customer has all the required items in the cart and clicks proceed to checkout		
Type: External/ <u>Temporal</u>		
Preconditions: <ol style="list-style-type: none"> 1. Rainbow grocery outlet website should be up and running. 2. Customers have access to a shopping cart. 3. Shopping cart has a screen mounted to it and has a working internet connection to access the store website. 4. Customer has successfully logged into the system 5. Order database should be up to date. 6. Cart database should be up to date. 7. Customers should provide valid payment information. 8. Cart total is displayed to the customer. 		
Normal Course: <ol style="list-style-type: none"> 1. System tallies the items in the shopping list and the cart and prompts the customer if there is a difference. 2. Customer chooses to either add the item or go ahead with the existing items in the cart. 3. System asks the customer to provide credit card information. 4. Payment gateway validates the payment information. 5. Customer card details are saved in the customer payment data store if allowed. 6. Payment by the customer is validated. 7. System displays the message about the payment status. 8. Order details are captured in the database and the customer is provided with the order receipt. 9. The customer logs out of the system. 		Information for Steps <ul style="list-style-type: none"> 1. Shopping list and cart items tally 2. Customer choice 3. Credit Card Information 4. Payment info validation 5. Customer Card Details 6. Payment validation 7. Payment Status 8. Order details 9. Order receipt 10. Logs out
Post conditions: <ol style="list-style-type: none"> 1. After a successful order, the customer is provided with an order receipt. 2. Order details are captured in the Order Data store. 		

3. Customer logs out of the system.

Exceptions:

E1: Credit card doesn't work.

1. The system displays the message "Please enter Card info again".

E2: Payment verification fails.

1. The system displays the message "Payment failed, please try again".

Summary Inputs	Source	Outputs	Destination
Credit card information	Customer	Customer Card details	Customer Payment Data store
Customer choice	Customer	Payment status	Customer
Logs out	Customer	Shopping list and cart items tally	Customer
Payment validation	Credit card clearinghouse	Payment info validation	Credit card clearing house
		Order details	Order Data store
		Order receipt	Customer

Use Case Name: System Updates	ID: UC-8	Priority: High
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Brief Description: System updates after the placement of the order.

Actor: System

Trigger: Successful Placement of the Order

Type: External/Temporal

Preconditions:

1. Order has been captured in the Order Data store.
2. Customer has been provided with the order receipt
3. Customer has successfully logged out the system
4. Customer database should be up to date.
5. Inventory database should be up to date.
6. Item database should be up to date.
7. Customer returns the cart at the designated place.

Normal Course:	Information for Steps
1. System updates the item data store.	Update Item Data Store
2. System sends notification to the Inventory Manager regarding the item count in the store.	Item count notification
3. System notifies the Inventory Manager and Store Manager if there is a low stock.	Low in stock notification
4. Inventory Manager delivers items to the Store.	Item delivery
5. Inventory manager updates the inventory according to the item delivered to the store ,updates Item database and promotion data store	Update Inventory/Item/promotion store
6. The store manager fills the items back in the shelves	Restocking the items

Post conditions:

1. Inventory Data store is up to date.
2. Item Data store is updated.
3. Low stock notification is sent to store manager and Inventory manager when item count is low.
4. Stock is refilled in the store shelves.

Exceptions:

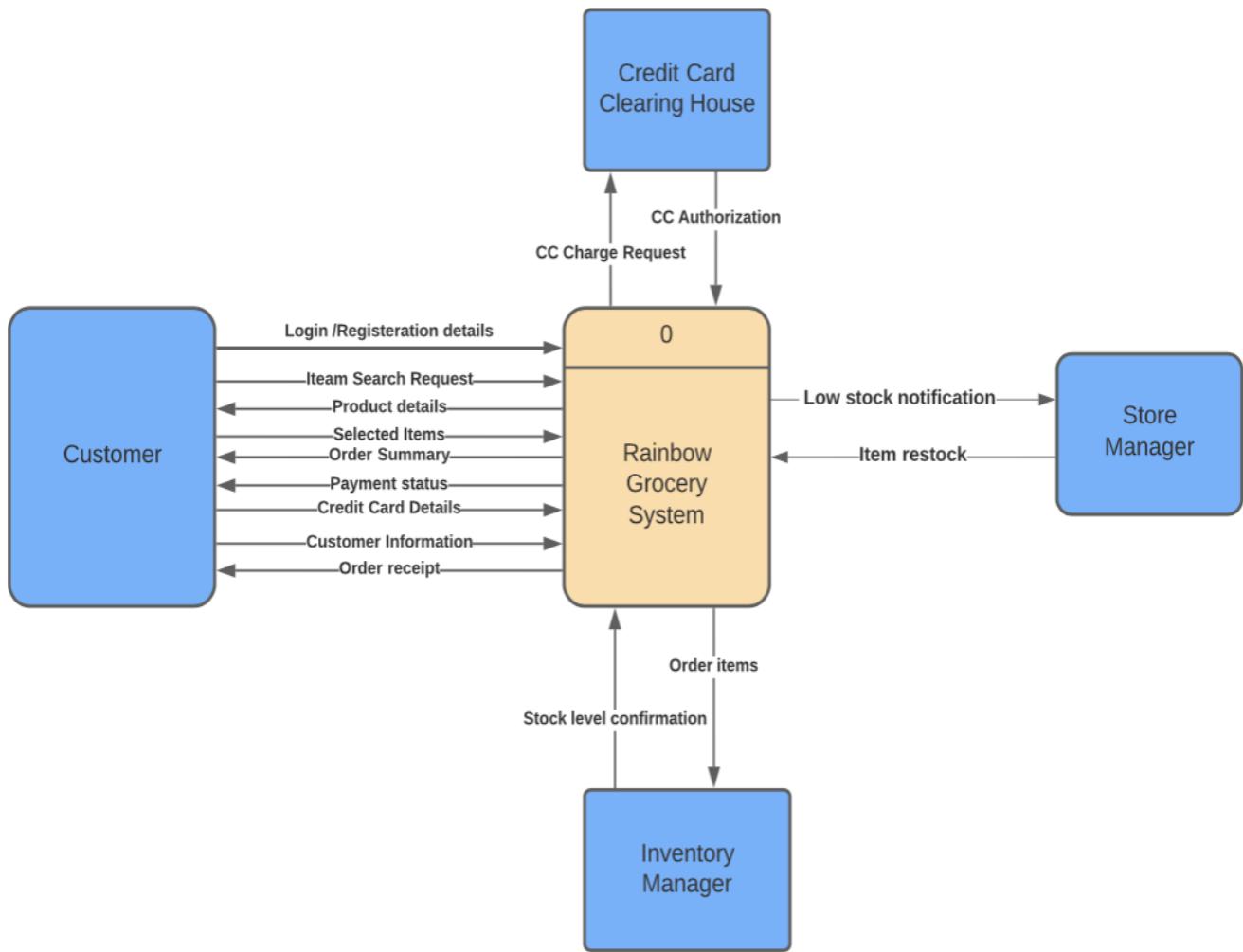
E1. Mismatch in the Inventory and Item Data Store.

1. The mismatch occurs because the Item Data store is not updated correctly.

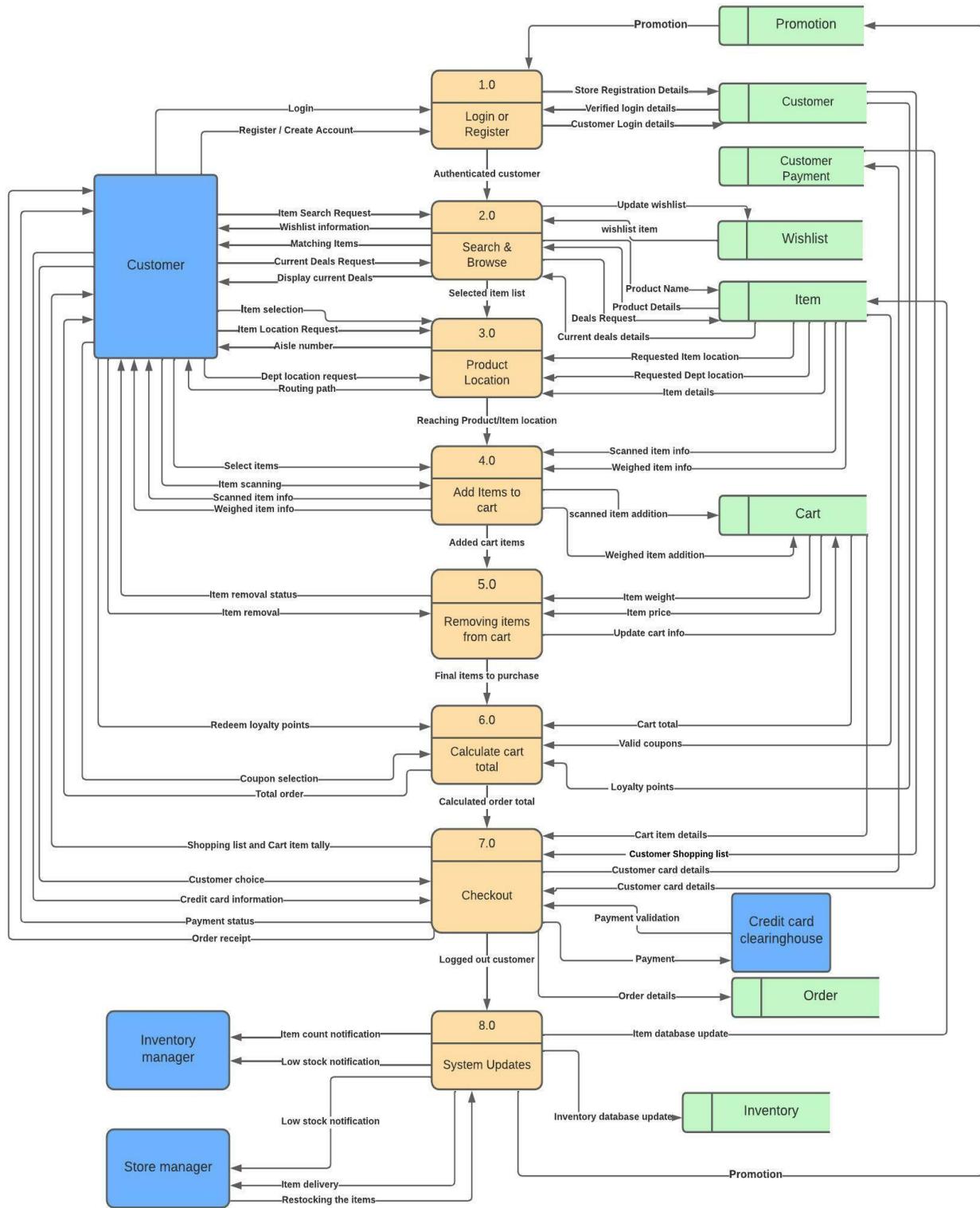
Summary Inputs	Source	Outputs	Destination
Restocking the item	Store manager	Update Item Data Store	Item Data store
		Item count notification	Inventory manager
		Low stock notification	Inventory manager Store manager
		Item delivery	Store manager
		Update Inventory Data store	Inventory Data store
		Update Item Data store	Item Data store
		Update Promotion Data store	Promotion Data store

DATA FLOW DIAGRAM

Context Diagram

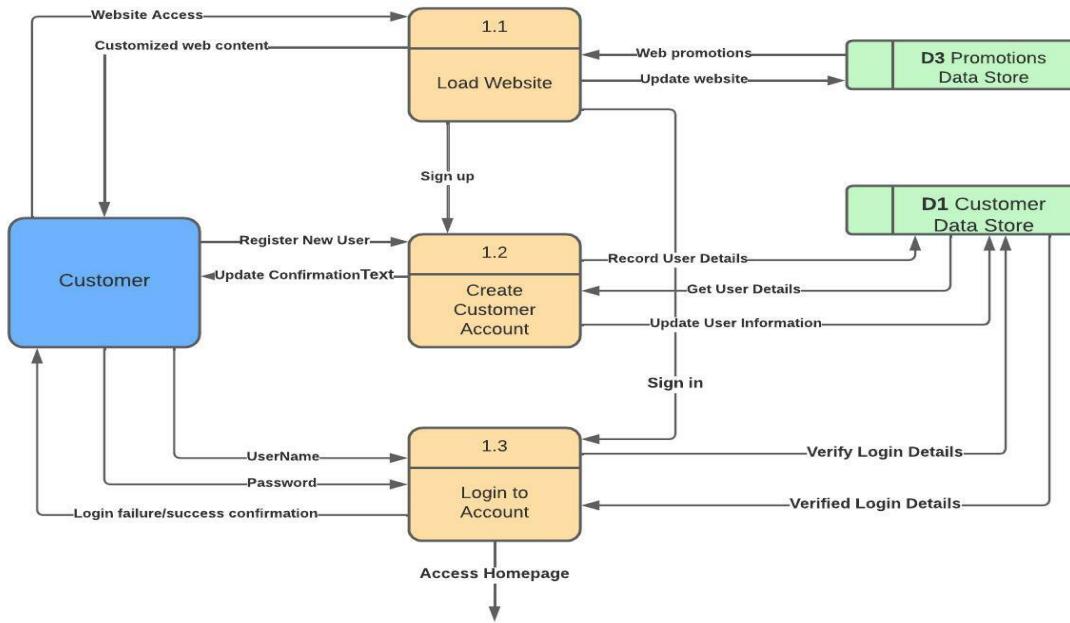


Level 0 Diagram

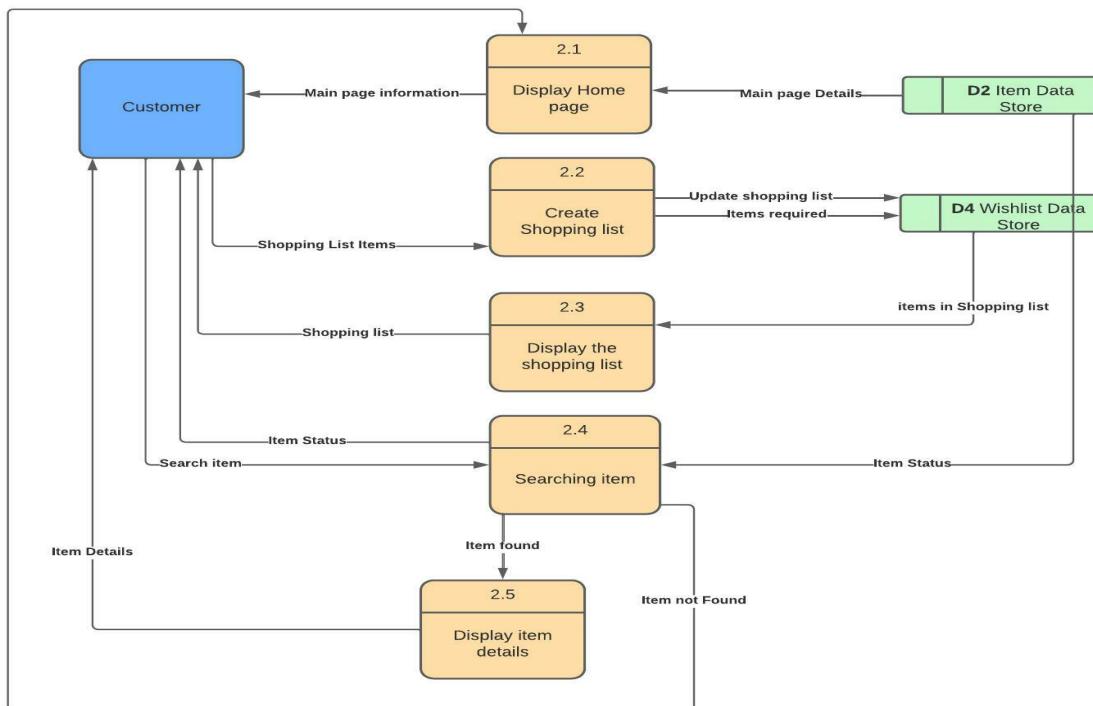


Level 1 Diagram

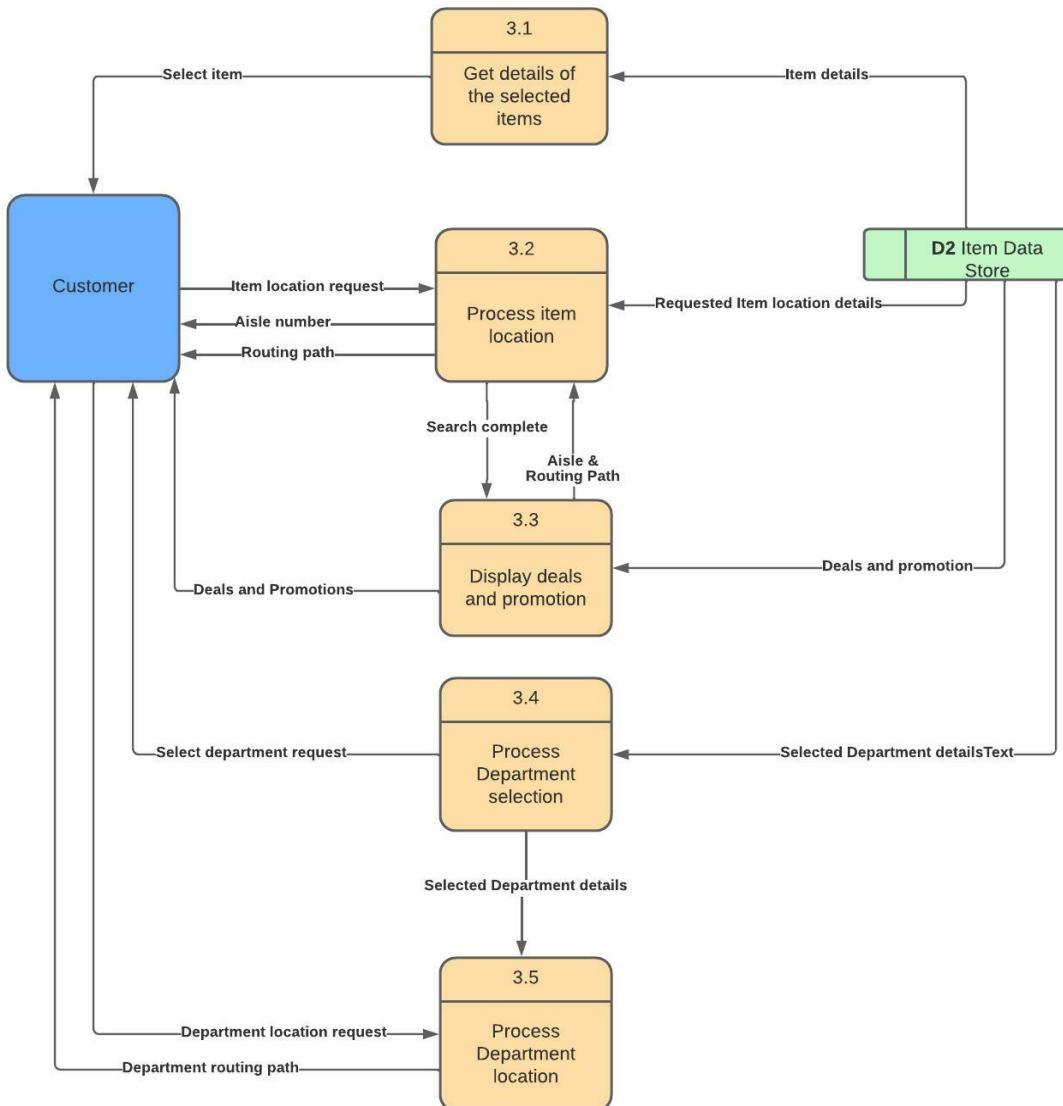
Use case 1



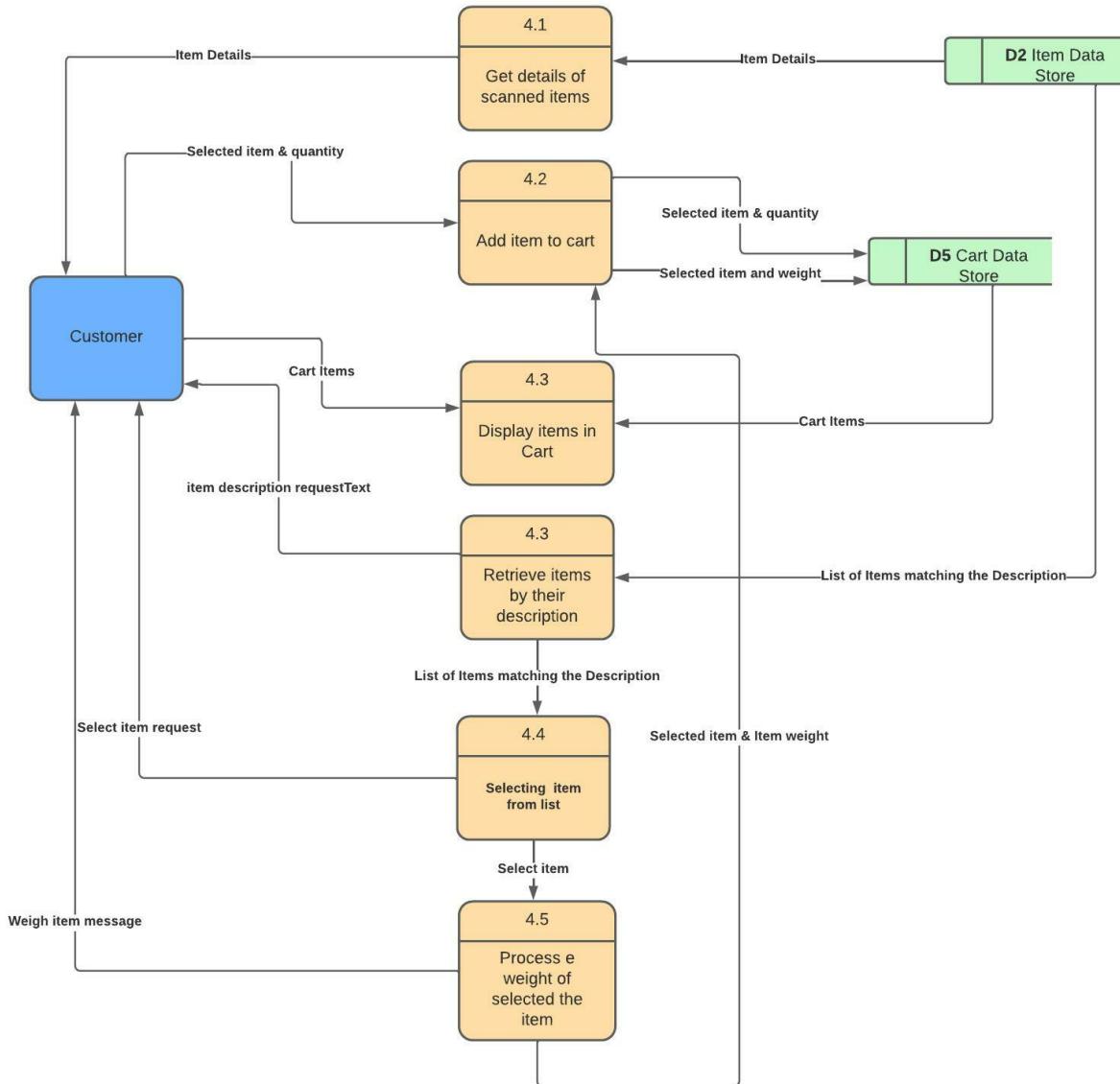
Use case 2



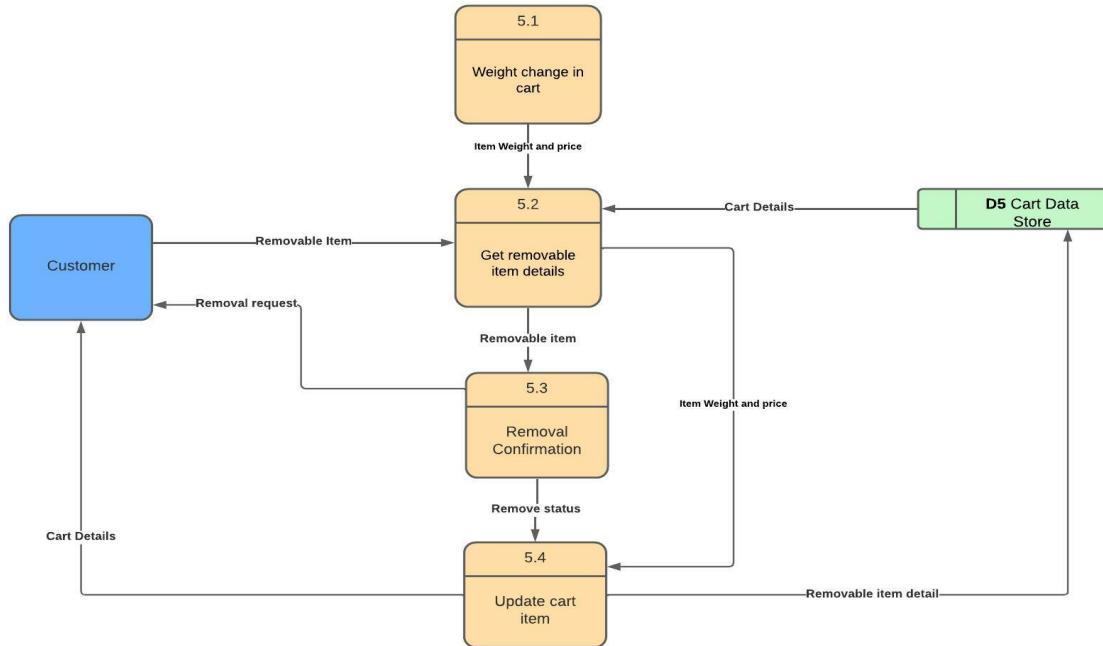
Use Case 3



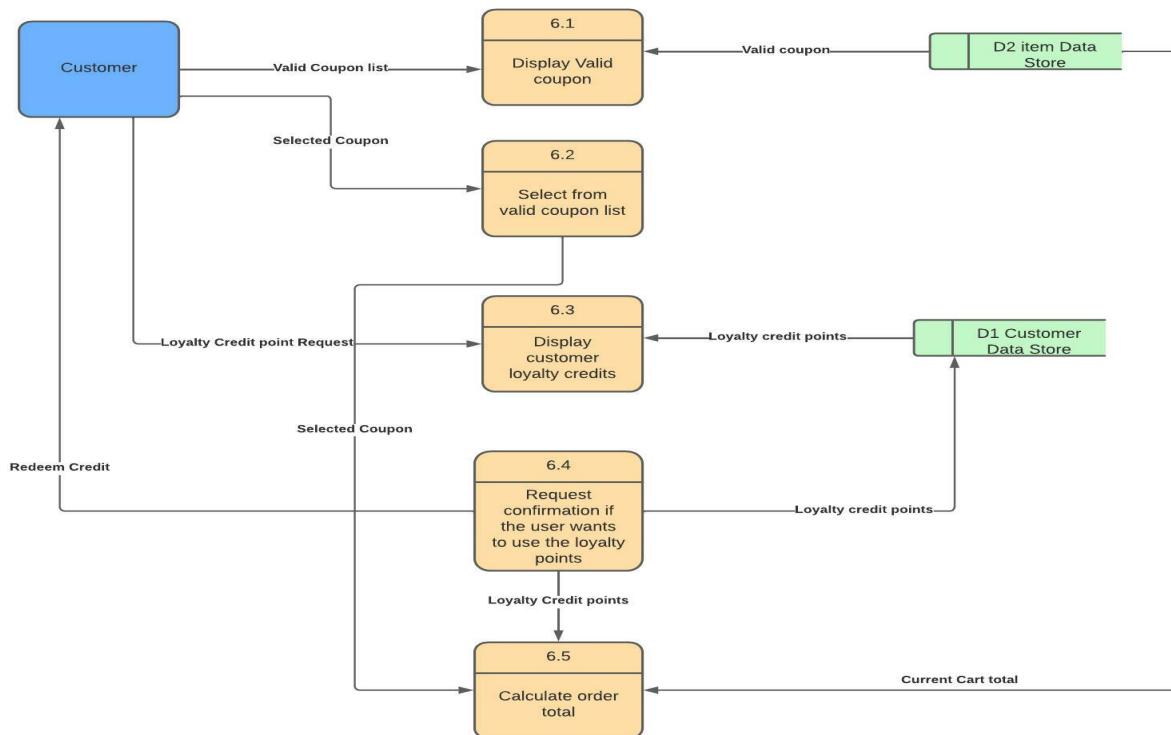
Use Case 4



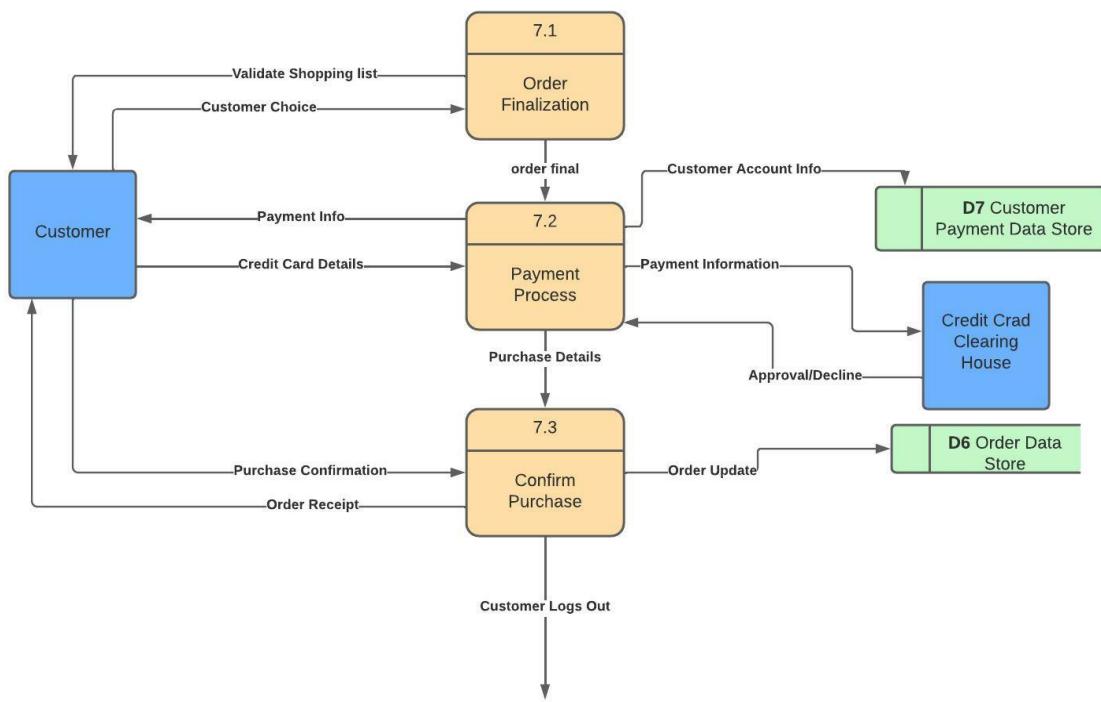
Use Case 5



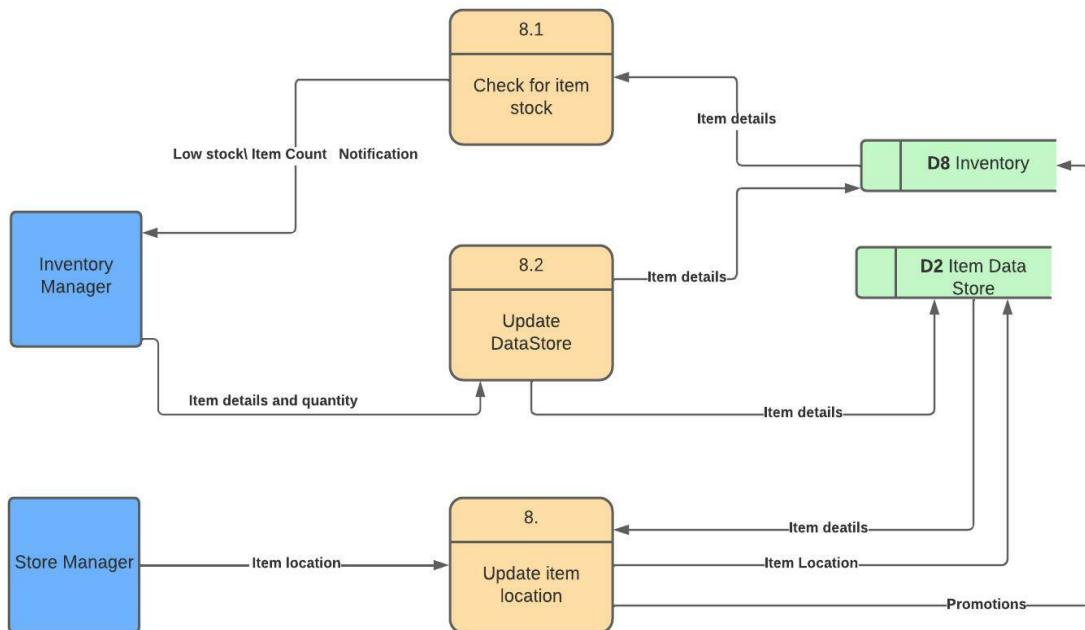
Use Case 6



Use Case 7



Use Case 8



DATA DICTIONARIES

DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D1	Customer	customer_id	Unique customer_id	Varchar	[A-Z,a-z,0-9,Special Characters]	Required
		first_name	Customer first name	Varchar	[A-Z,a-z,Special Characters]	Required
		last_name	Customer last name	Varchar	[A-Z,a-z,Special Characters]	Null
		email_Id	Email ID of Customer	Varchar	[A-Z,a-z,Special Characters]	Required
		phone_number	Contact phone information	Varchar	[0-9] and special Characters like +	Required
		date_of_birth	Birth date	MM/DD/YYYY Y	Date	Null
		sex	Sex of customer(male/female)	Varchar	[A-Z,a-z,Special Characters]	Null
		loyalty_points	Points given each customer for his purchase	Integer	[0-9]	Required
		line_address1	Address details of customer	Varchar	[A-Z,a-z,0-9,Special Characters]	Required
		line_address2		Varchar	[A-Z,a-z,0-9,Special Characters]	Null
		Country		Varchar	[A-Z,a-z]	Required
		Zipcode		Integer	[0-9]	Required
		State		Varchar	[A-Z,a-z]	Required

DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D2	Item	item_id	Unique item number	Integer	[0-9]	Required
		RFID	Unique barcode number	Integer	[0-9]	Required
		Item_name	Name of the item	Varchar	[A-Z,a-z,Special Characters]	Required
		item_department	Group item belongs to	Varchar	[A-Z,a-z,Special Characters]	Null
		item_weight	Weight of the item	Decimal	(10,2) Decimal number with length 10 and 2 decimal point	Null
		item_price	Price of the item	Decimal	(10,2)	Required
		item_description	More information about the item	Varchar	[A-Z,a-z,Special Characters]	Required
		Item_location_latitude	Should be accurate upto 6 decimal places	Decimal	(9,6)	Required
		Item_location_longitude	Should be accurate upto 6 decimal places	Decimal	(9,6)	Required
		department_Location_latitude	Should be accurate upto 6 decimal places	Decimal	(9,6)	Required
		department_Location_longitude	Should be accurate upto 6 decimal places	Decimal	(9,6)	Required

DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D3	Promotion	promotion_id	Unique Promotion id	Integer	[0-9]	Required
		item_id	Unique item number	Integer	[0-9]	Required
		promotion_code	Code set for each promotion	Varchar	[A-Z,a-z,Special Characters,0-9]	Required
		valid_from_date	Date when the promotion starts	MM/DD/YYYY	Date	Required
		valid_to_date	Date when the promotion ends	MM/DD/YYYY	Date	Required

DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D4	Wishlist	customer_id	Unique customer_id	Varchar	[A-Z,a-z,0-9,Special Characters]	Required
		item_id	Unique item number	Integer	[0-9]	Required
		Item_name	Name or description of the item	Varchar	[A-Z,a-z,Special Characters]	Required
		item_quantity	Item quantity required	Integer	[0-9]	NULL

DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D5	Cart	cart_id	Unique cart_id	Integer	[0-9]	Required
		customer_id	Unique customer_id	Varchar	[A-Z,a-z,0-9,Special Characters]	Required
		item_id	Unique item number	Integer	[0-9]	Required
		RFID	Unique barcode number	Integer	[0-9]	Required
		Item_name	Name of the item	Varchar	[A-Z,a-z,Special Characters]	Required
		item_weight	Weight of the item	Decimal	(10,2) Decimal number with length 10 and 2 decimal point	Null
		item_quantity	Quantity of item	Integer	[0-9]	Required
		item_price	Price of the item	Decimal	(10,2)	Required
		promotion_code	Code set for each promotion	Varchar	[A-Z,a-z,Special Characters,0-9]	Null
		loyalty_points	Points for purchase	Integer	[0-9]	Null
		cart_total	Total purchase amount	Decimal	(10,2)	Required

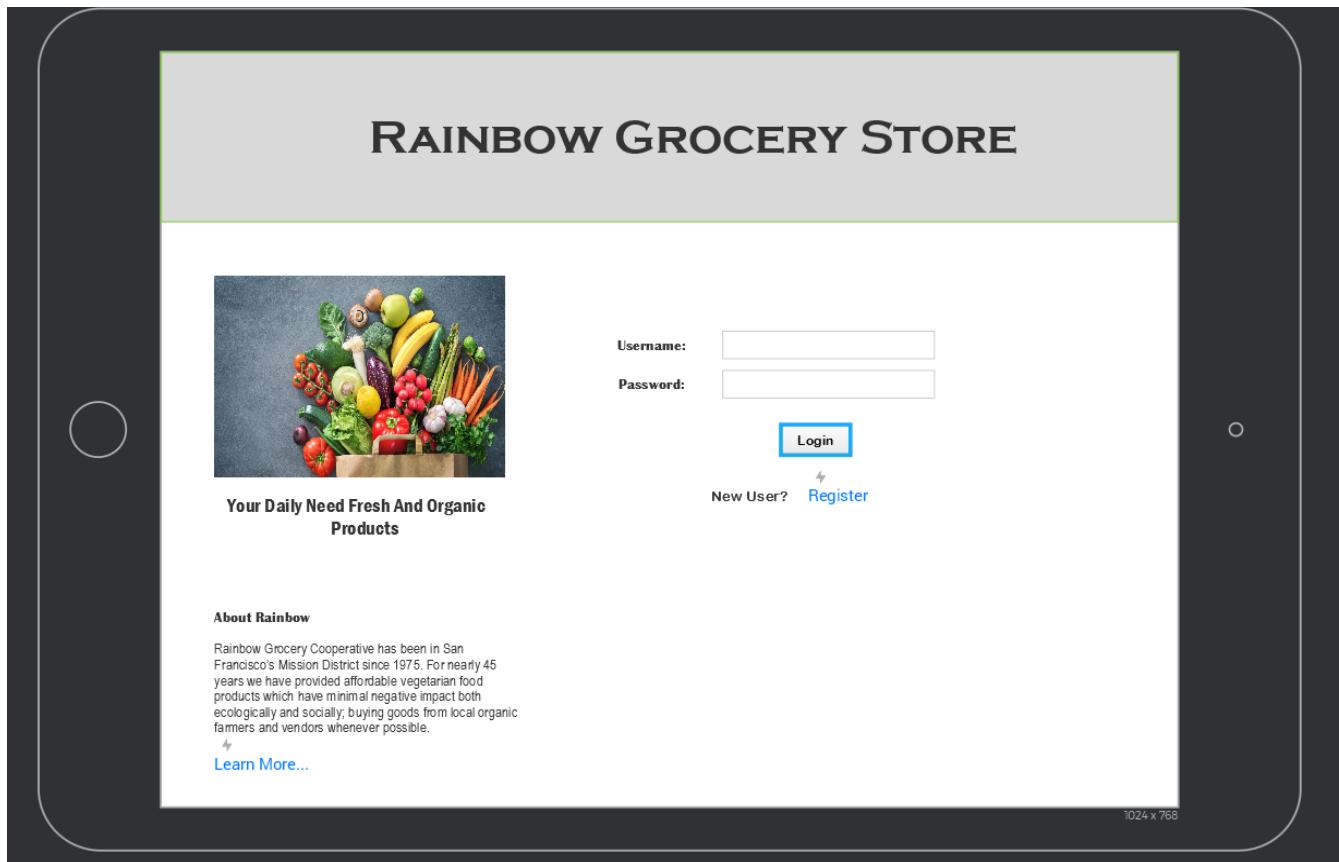
DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D6	Order	Order_id	Unique Order_id	Varchar	[A-Z,a-z,0-9,Special Characters]	Required
		customer_id	customer_id from customer table	Varchar	[A-Z,a-z,0-9,Special Characters]	Required
		cart_id	cart_id from Cart table	Integer	[0-9]	Required
		order_date	Date of the order	MM/DD/YY YY	Date	Required
		order_total	Total order price	Decimal	(10,2)	Required
		payment_status	Status of the payment	Boolean	True/False	Required

DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D7	CustomerPayment	payment_id	Unique Payment_id	Integer	[0-9]	Required
		customer_id	customer_id from Customer table	Varchar	[A-Z,a-z,Special Characters]	Required
		card_number	Credit card number	Integer	[0-9]	Required
		name_on_card	Name of the cardholder	Varchar	[A-Z,a-z,Special Characters]	Required
		valid_from_date	Date from which credit card is valid	MM/DD/Y YYY	Date	Required
		valid_to_date	Date on which credit card expires	MM/DD/Y YYY	Date	Required

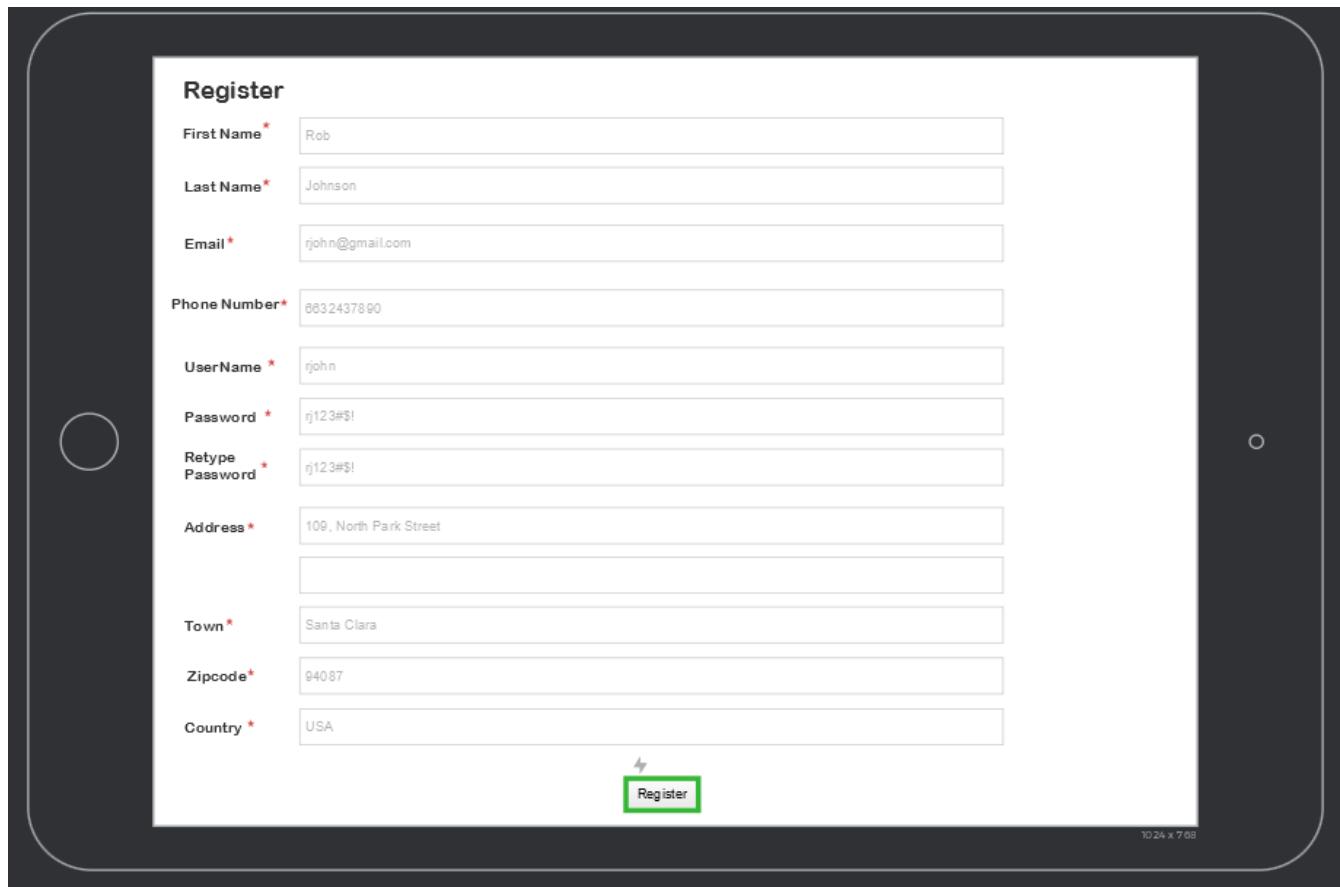
DATA	NAME	ATTRIBUTE	DESCRIPTION	DATA TYPE	DOMAIN	DEFAULT VALUES
D8	Inventory	inventory_item_id	Unique item number	Integer	[0-9]	Required
		RFID	Unique barcode number	Integer	[0-9]	Required
		Item_name	Name of the item	Varchar	[A-Z,a-z,Special Characters]	Required
		item_department	Group item belongs to	Varchar	[A-Z,a-z,Special Characters]	Null
		item_weight	Weight of the item	Decimal	(10,2) Decimal number with length 10 and 2 decimal point	Null
		item_price	Price of the item	Decimal	(10,2)	Required
		item_description	More information about the item	Varchar	[A-Z,a-z,Special Characters]	Required
		Supplier_ID	Unique item number	Integer	[0-9]	Required
		Supplier_name	Name of the item	Varchar	[A-Z,a-z,Special Characters]	Required

USER INTERFACE PROTOTYPE

Mainpage



Register New User



A registration form titled "Register". It includes fields for First Name (Rob), Last Name (Johnson), Email (rjohn@gmail.com), Phone Number (663.243.7890), UserName (rjohn), Password (rj123#\$!), Retype Password (rj123#\$!), Address (109, North Park Street), Town (Santa Clara), Zipcode (94087), and Country (USA). A green "Register" button is at the bottom.

10.24 x 7.08

First Name *	Rob
Last Name *	Johnson
Email *	rjohn@gmail.com
Phone Number *	663.243.7890
UserName *	rjohn
Password *	rj123#\$!
Retype Password *	rj123#\$!
Address *	109, North Park Street
Town *	Santa Clara
Zipcode *	94087
Country *	USA

Register

Customer Log In



The login page for Rainbow Grocery Store features a header with the text "RAINBOW GROCERY STORE" and a background image of various fresh fruits and vegetables. Below the header is a promotional message: "Your Daily Need Fresh And Organic Products". The login form includes fields for Username (rjohn) and Password, a "Login" button, and links for "New User?" and "Register".

10.24 x 7.08

RAINBOW GROCERY STORE

Your Daily Need Fresh And Organic Products

About Rainbow

Rainbow Grocery Cooperative has been in San Francisco's Outer Richmond since 1973. For nearly 45 years we have provided affordable vegetarian food products which have minimal negative impact both ecologically and socially; buying goods from local organic farmers and vendors whenever possible.

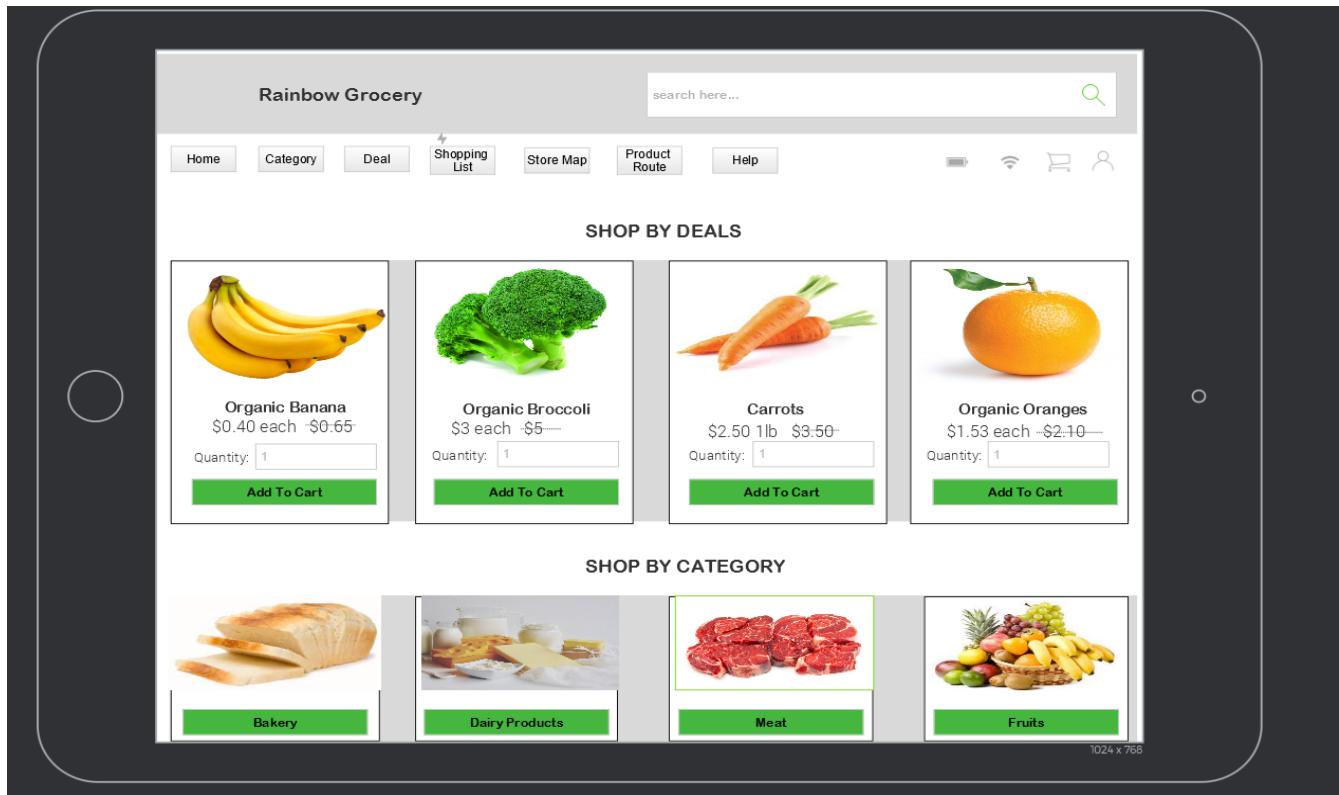
Learn More...

Username: rjohn
Password:

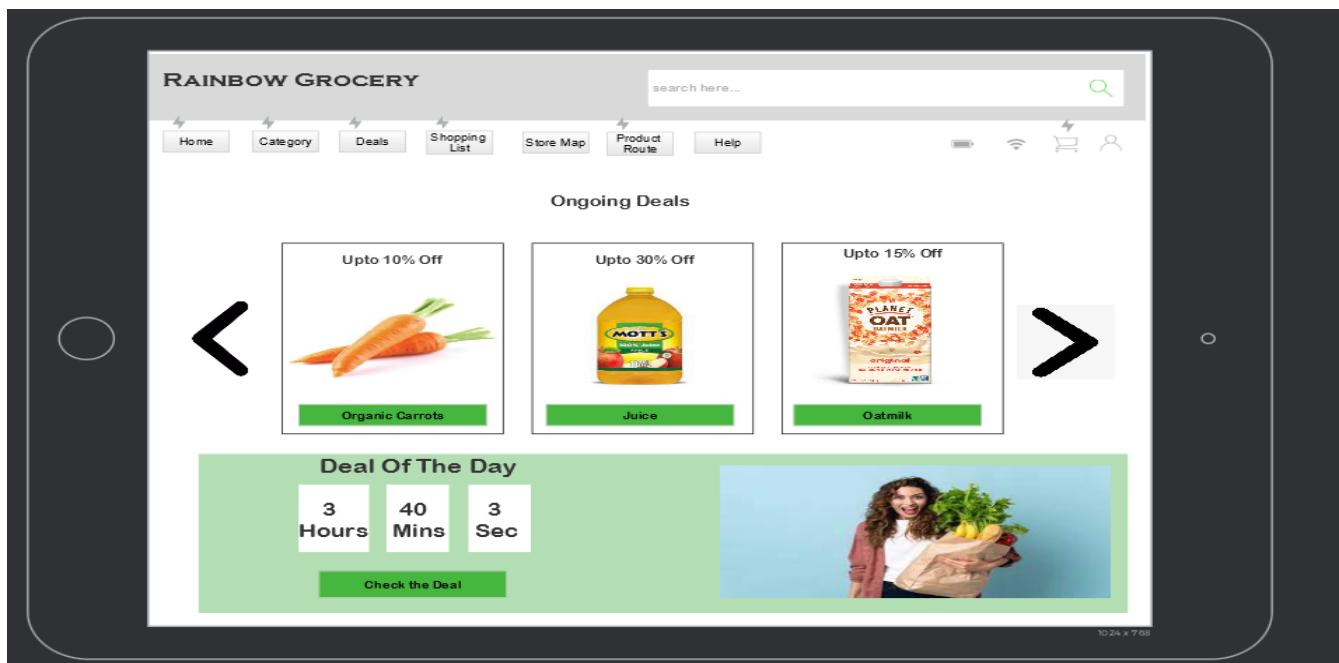
Login

New User? Register

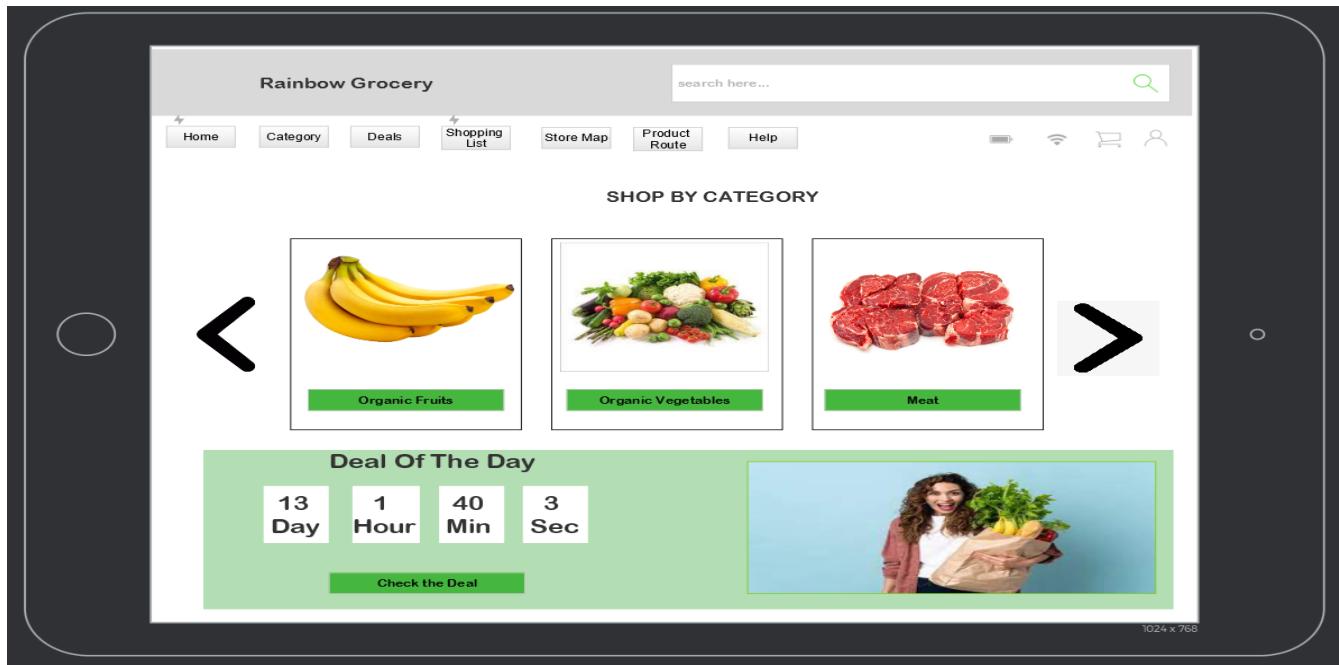
Home Page



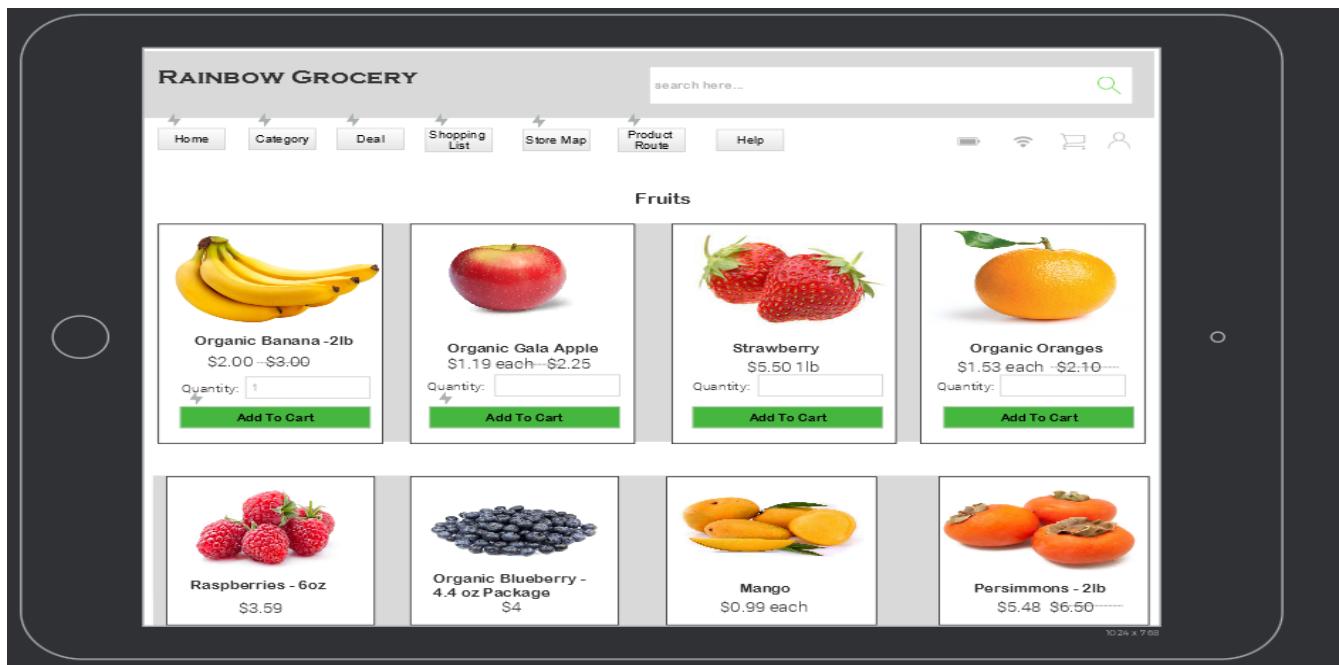
Deals



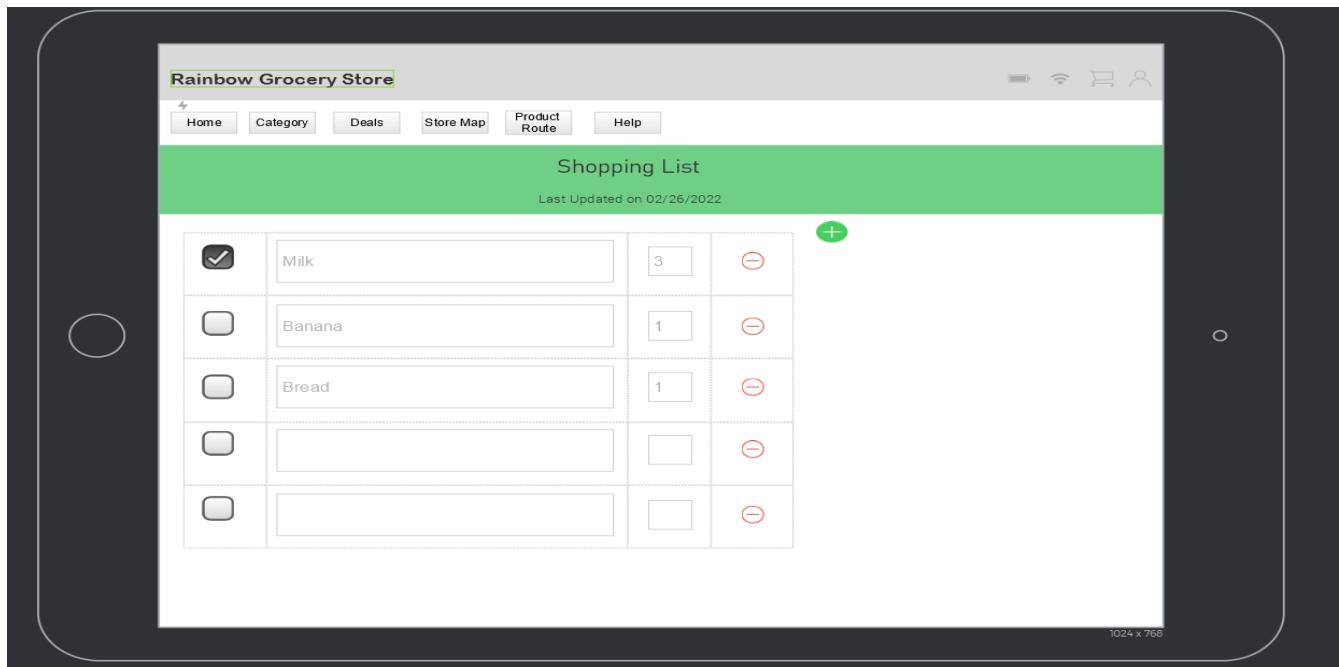
Page Category



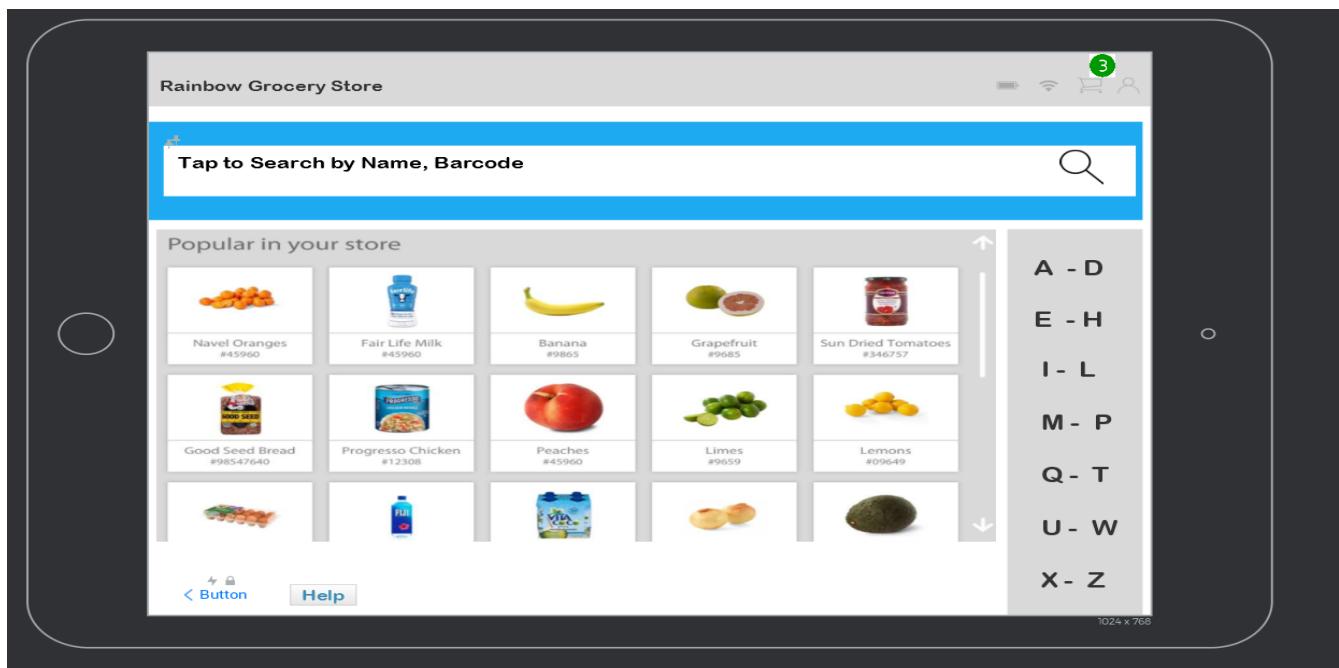
On Click Of A Category



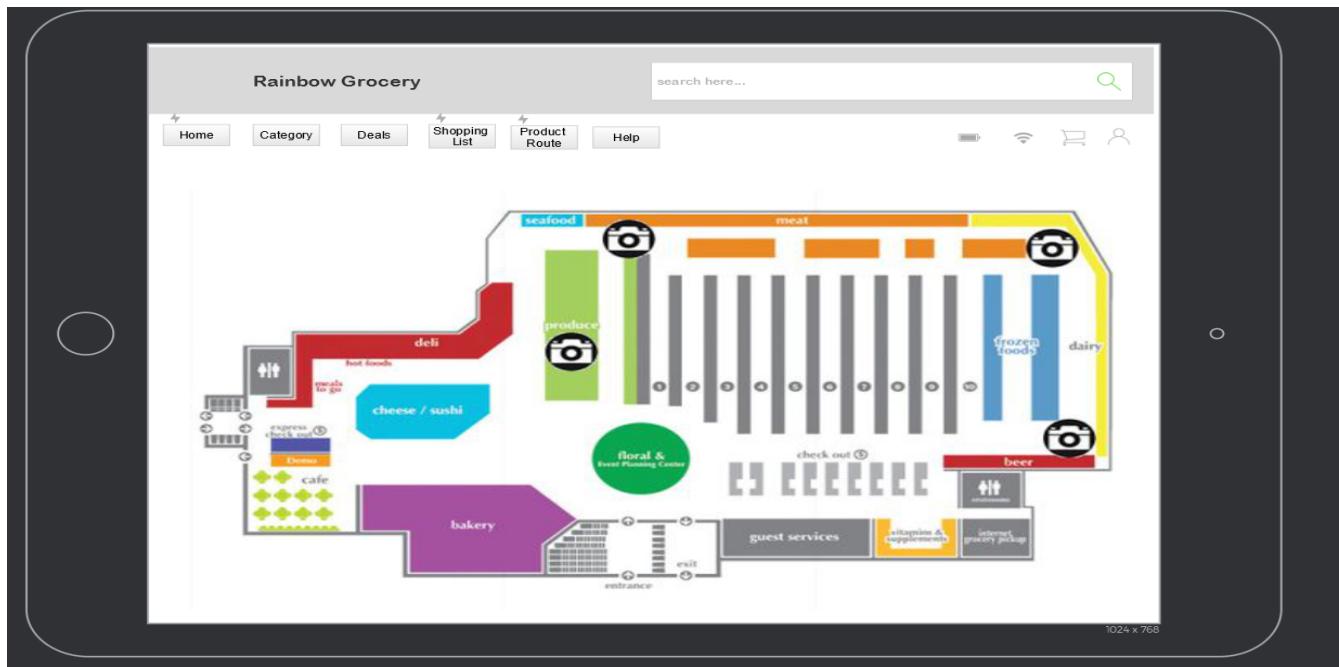
Shopping List



Search

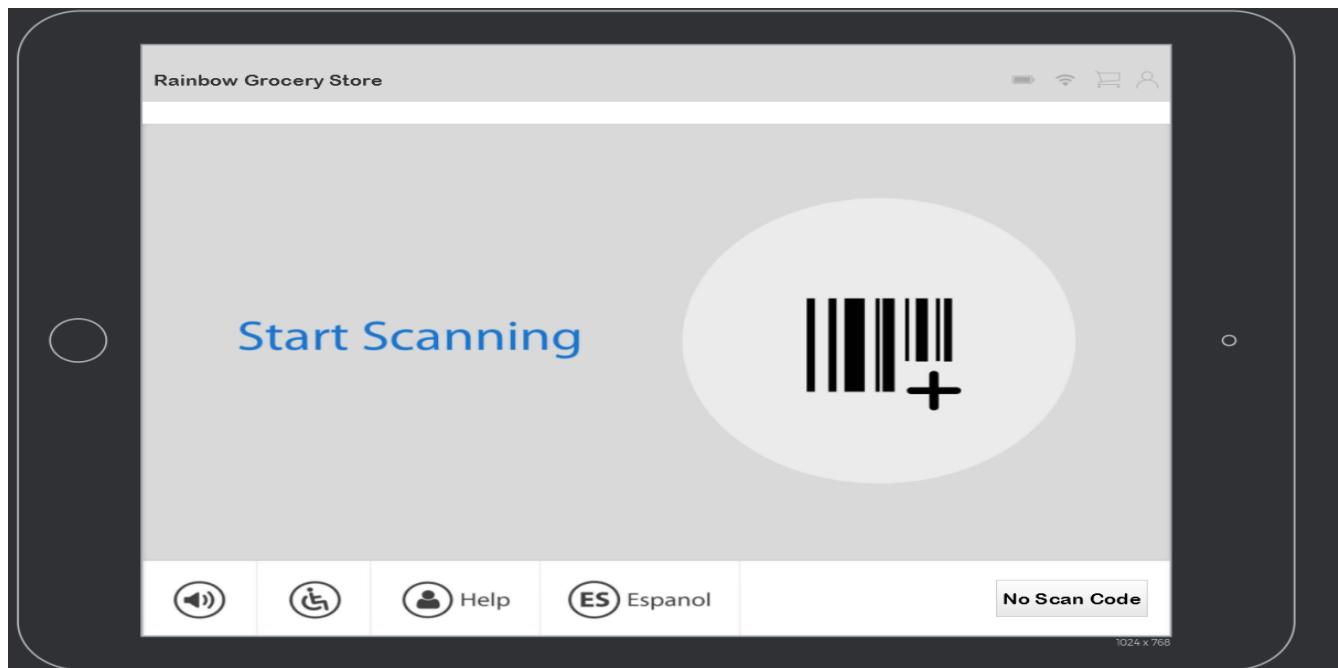


Locate A Product

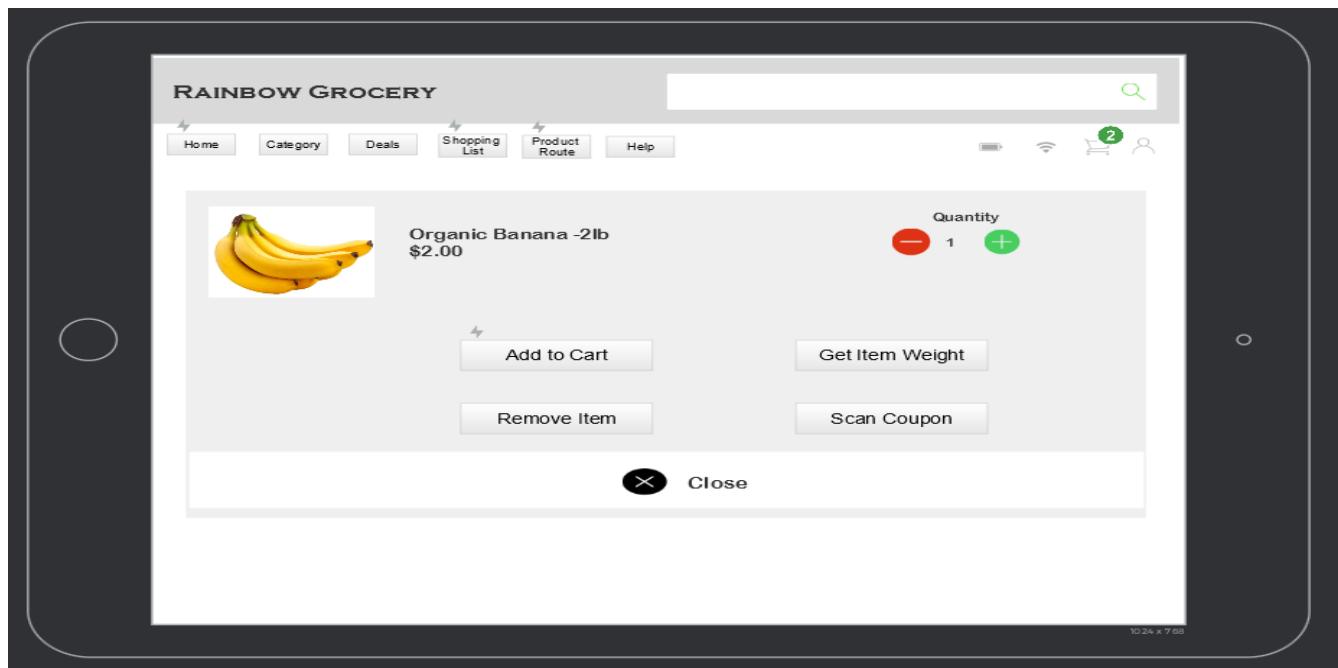


Add Item To Cart

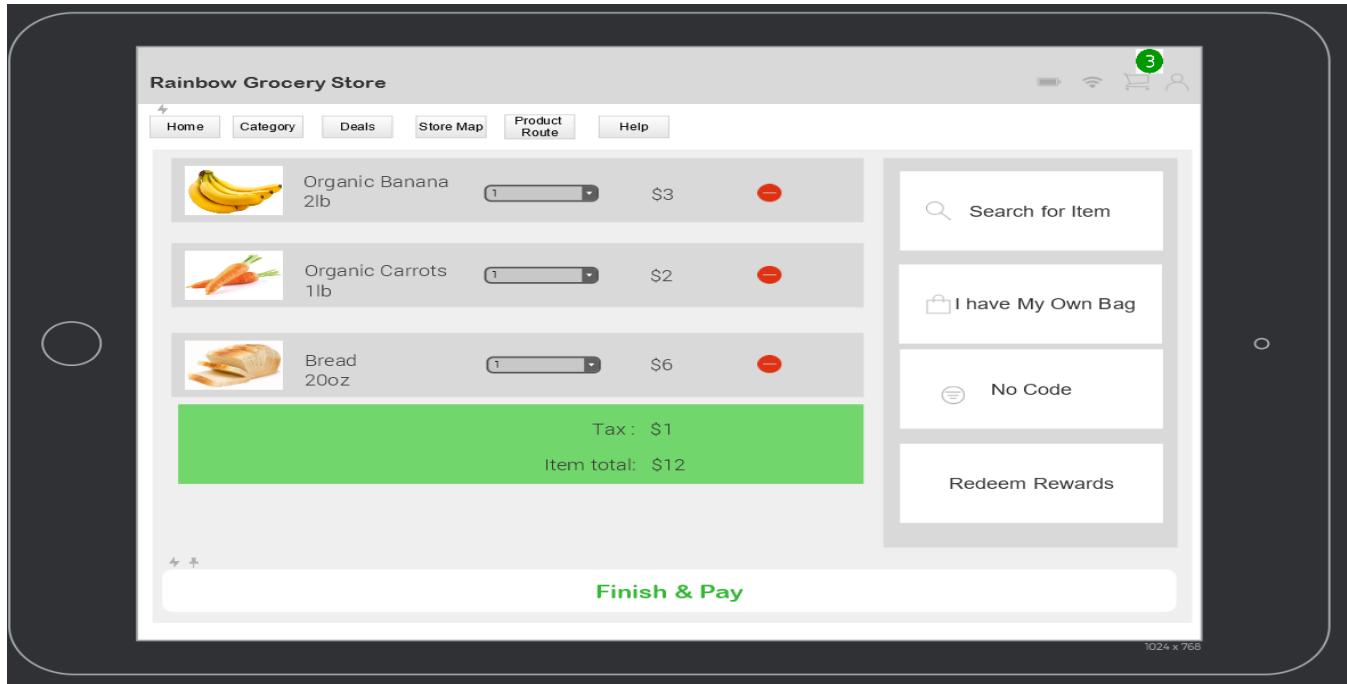
Scan Item



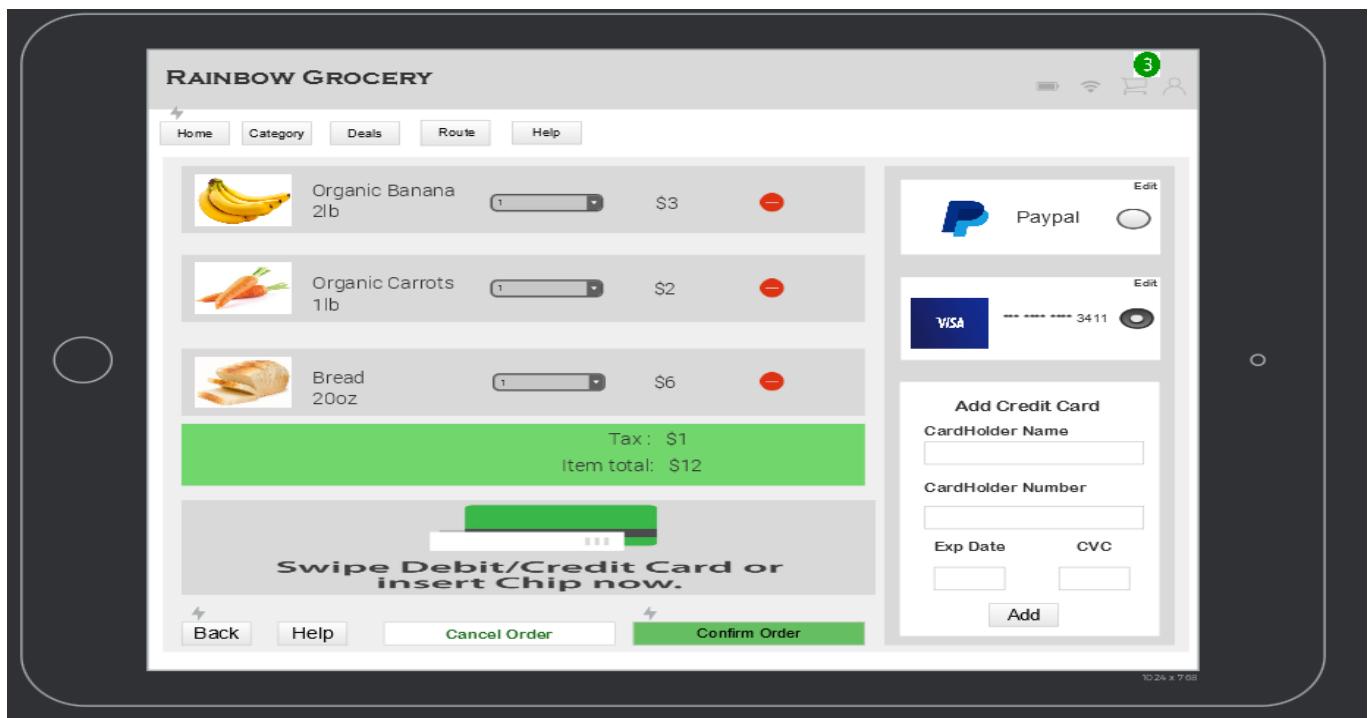
Update The Selection



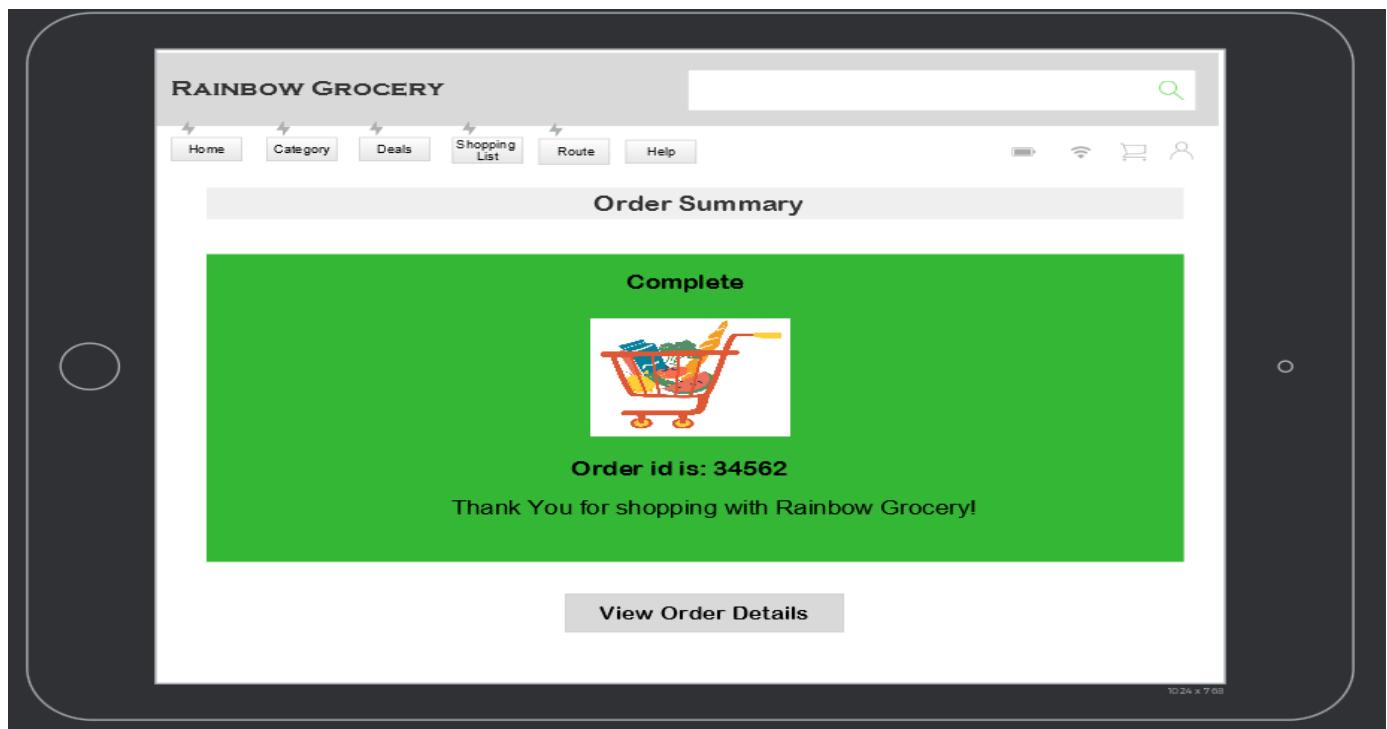
Cart and order total



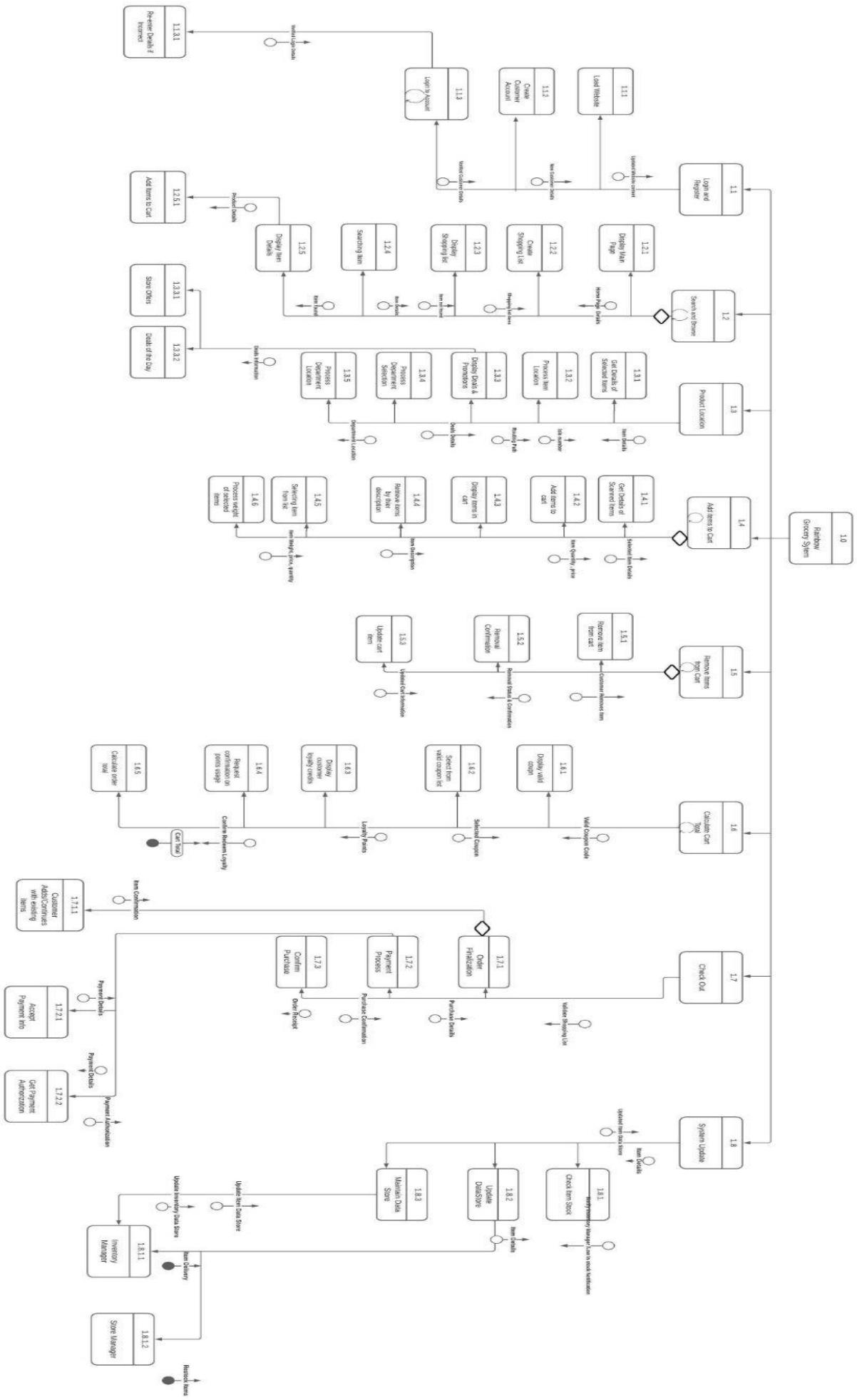
Payment



Order Summary



STRUCTURE CHART



REFERENCES

https://www.youtube.com/watch?v=2_c-9vJi4b0

<https://www.caper.ai/>