Mughal Online Mart - Shopping & Inventory Management System

PROGRAMMING FUNDAMENTALS PROJECT

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Project Overview

A comprehensive C++ console-based application that implements a dual-mode shopping and inventory management system. The system supports both administrator and customer interfaces with robust file-based data persistence.

System Architecture

Main Components

```
┌─────────────────────────────────────────────┐
│        MAIN APPLICATION                      │
├───────────────────────┬─────────────────────┤
│    ADMIN MODULE        │   CUSTOMER MODULE    │
│ • Authentication       │ • Login/Signup       │
│ • Product Management    │ • Shopping Interface │
│ • Inventory Monitoring  │ • Cart Management    │
│ • Sales Reporting       │ • Bill Generation    │
│ • Discount Management   │ • Settings           │
└───────────────────────┴─────────────────────┘
```

Data Storage Structure
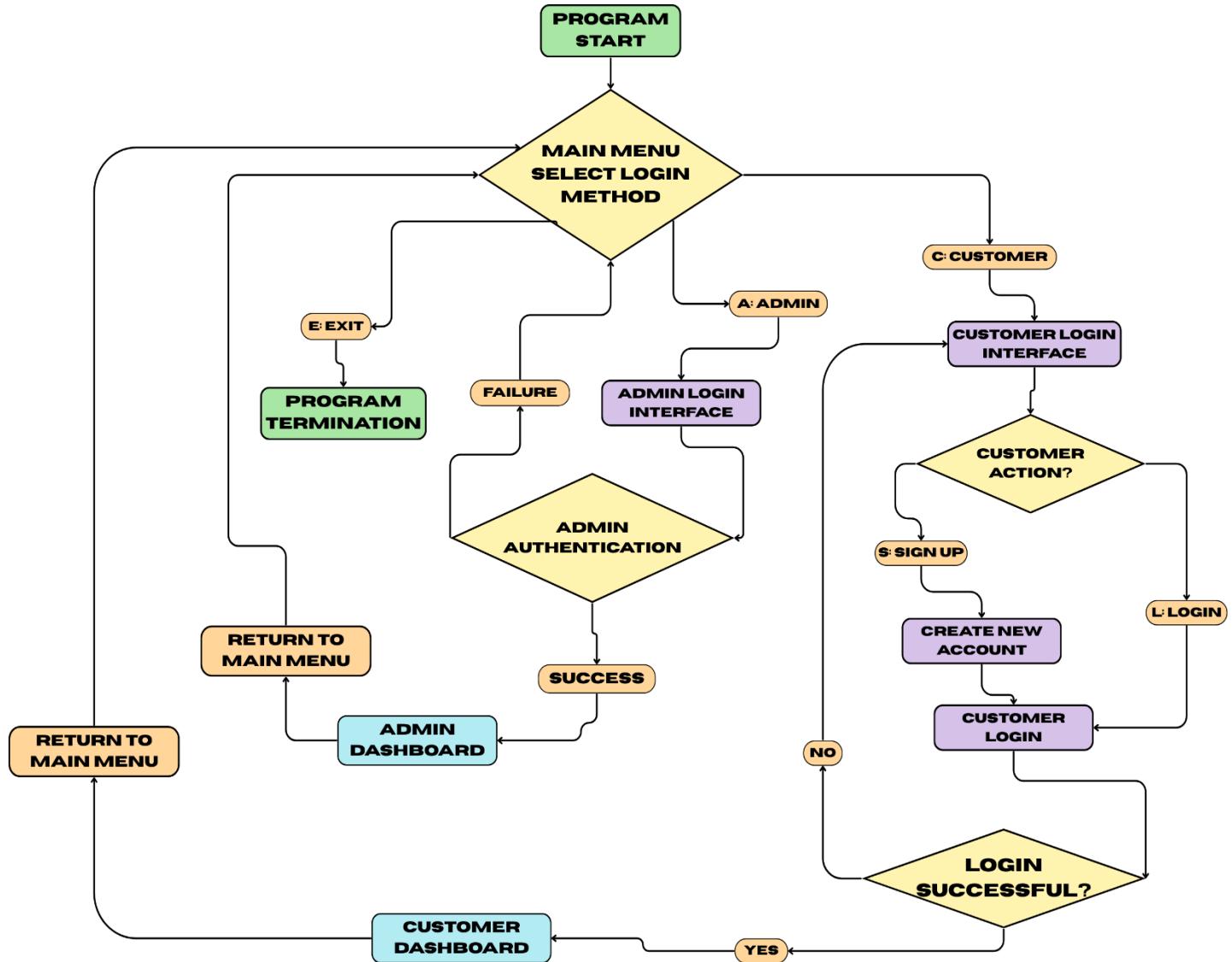
```
Project Directory/
├── Categories/       # Product category files
│   ├── Computer and Electronics.txt
│   ├── Beverages.txt
```

```
│   └── ... (10 categories)
├── Logins/          # Authentication files
│   ├── Admin Login.txt
│   └── Customer Login.txt
├── Sales Reports/     # Transaction history
│   └── Sales.txt
├── Discount Codes/     # Promotional codes
│   └── Discount & promo Codes.txt
└── Purchase Reports/   # Customer receipts
    └── {CustomerName}.txt
```
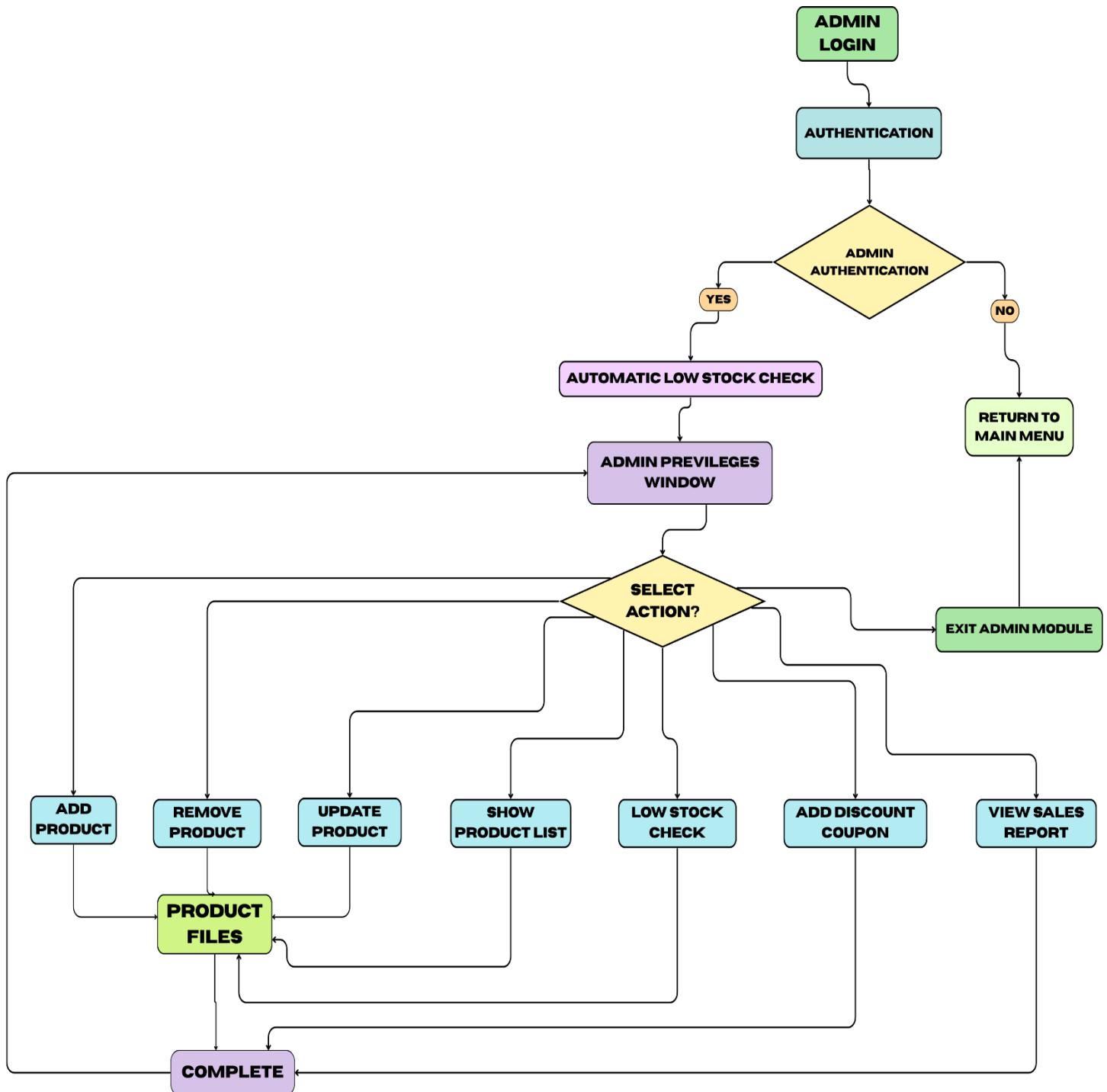
Workflow Diagrams

Main Workflow
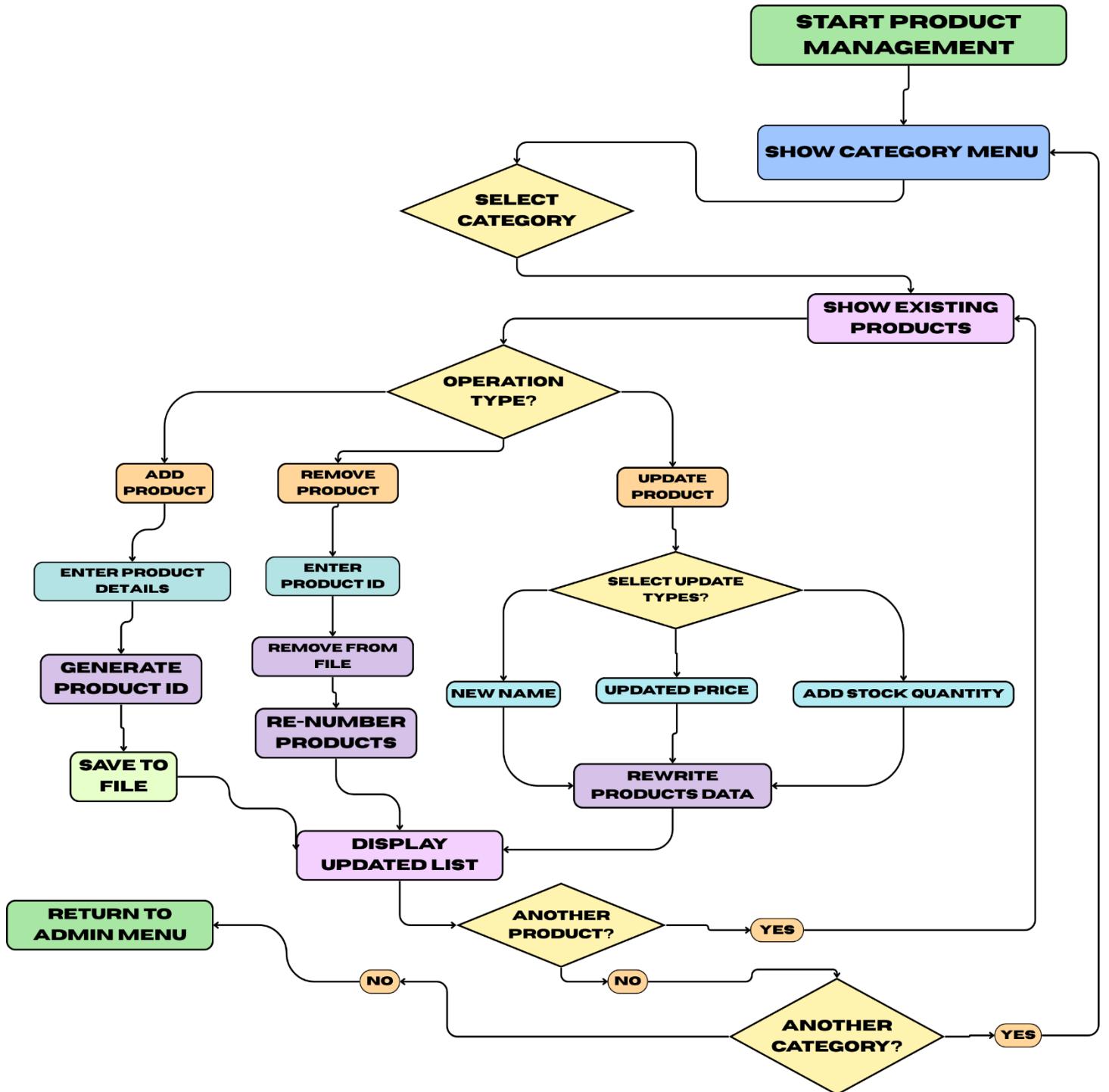
Admin Module Workflow

This below diagram is the most basic functionality described of the Admin Module. User starts with login system then after login he is shown the automatic low stock check and then the Admin Panel is shown to the user from where he can perform different operations. See Diagram:
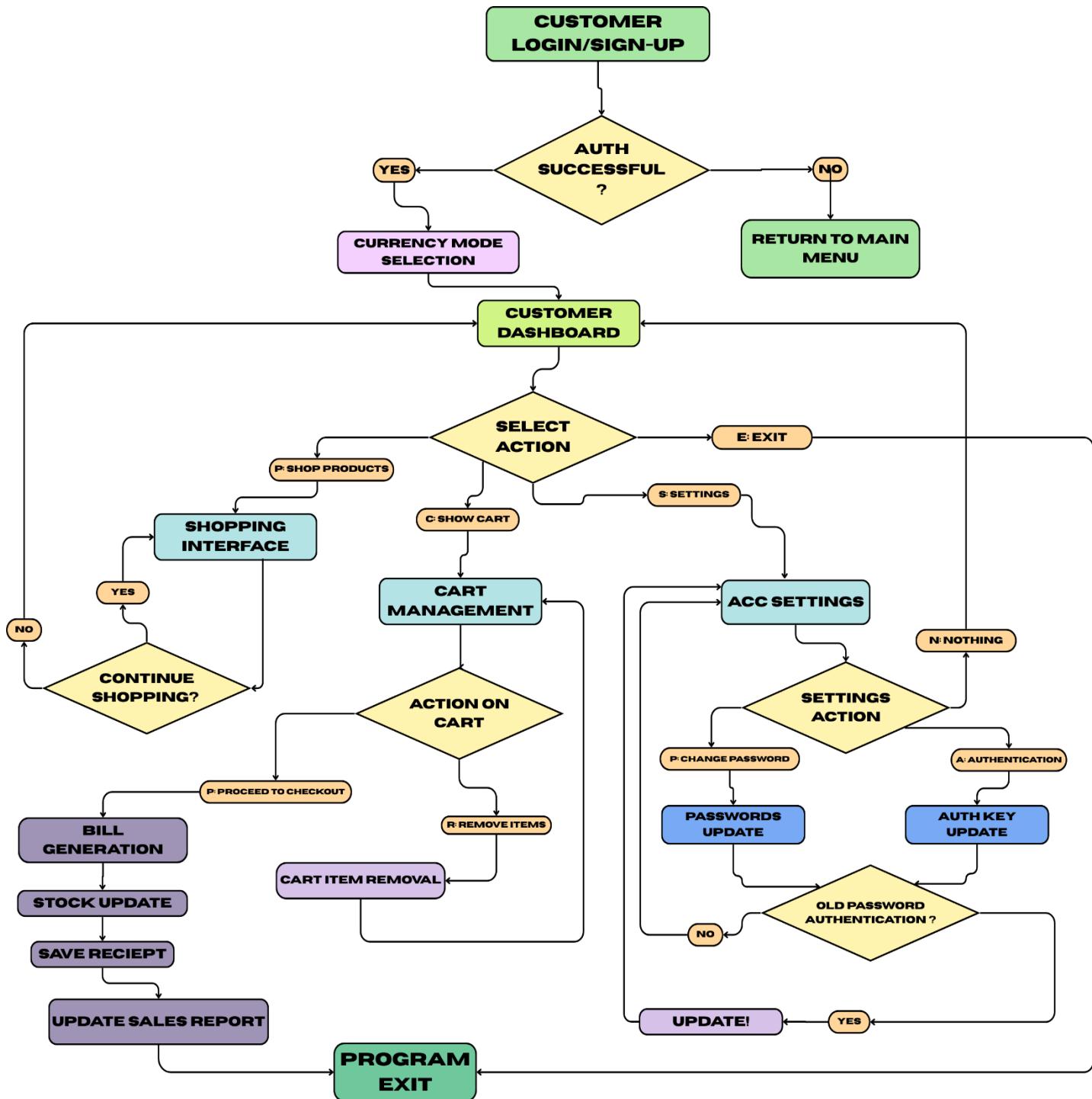
Admin Product Management Workflow

This below flowchart explains the working of the whole Products Data Manipulation. How the admin the changes that admin makes are reflected at the backend of the program. And how this data is stored in the files. See Diagram:
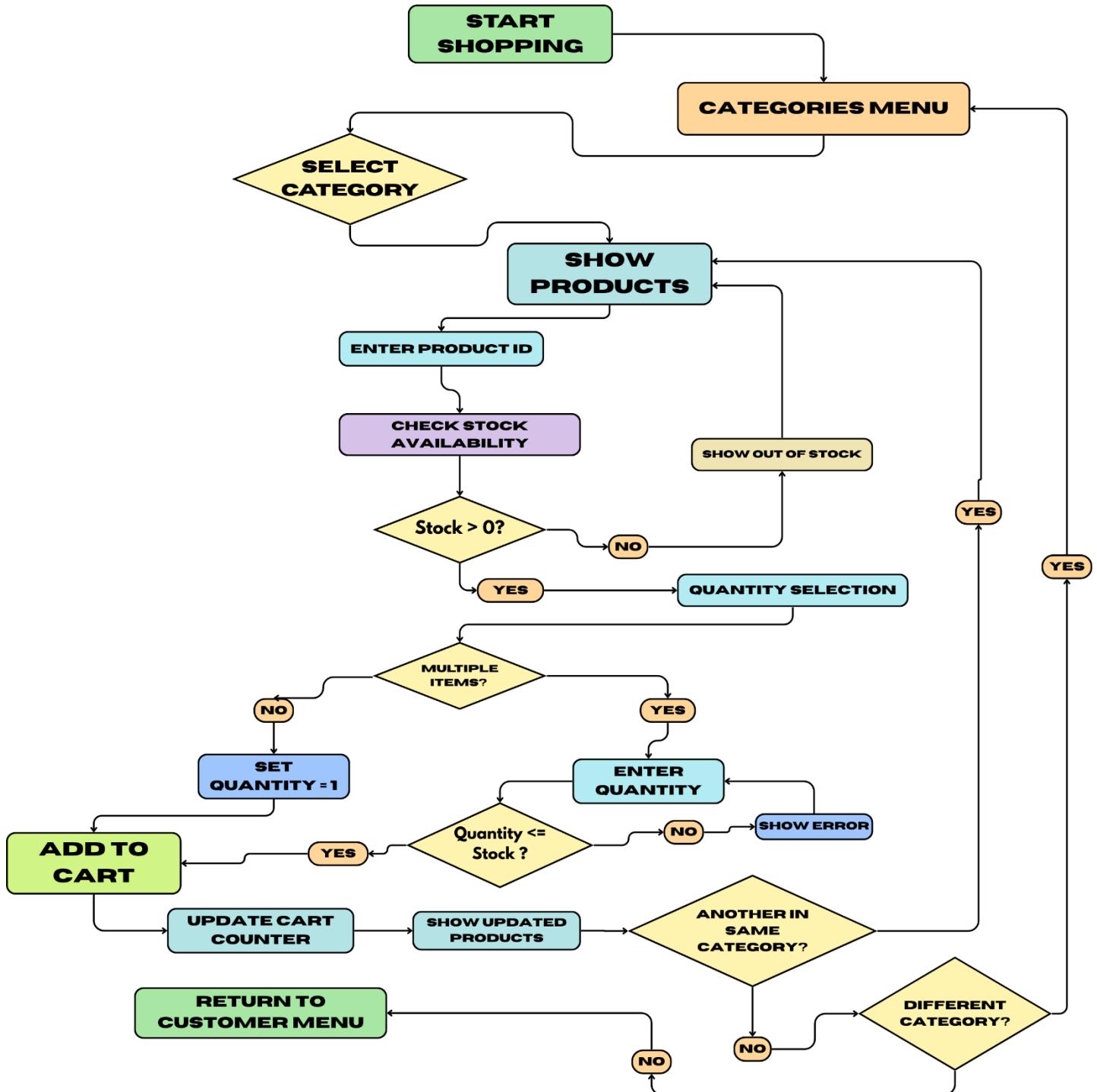
Customer Module Workflow

This Workflow is the basic flow in which the Customer Module is operating. It start's with the login/sign-up method for new/old customers after that user comes to the dashboard and perform whatever operation he wants from the Selection. See Diagram:
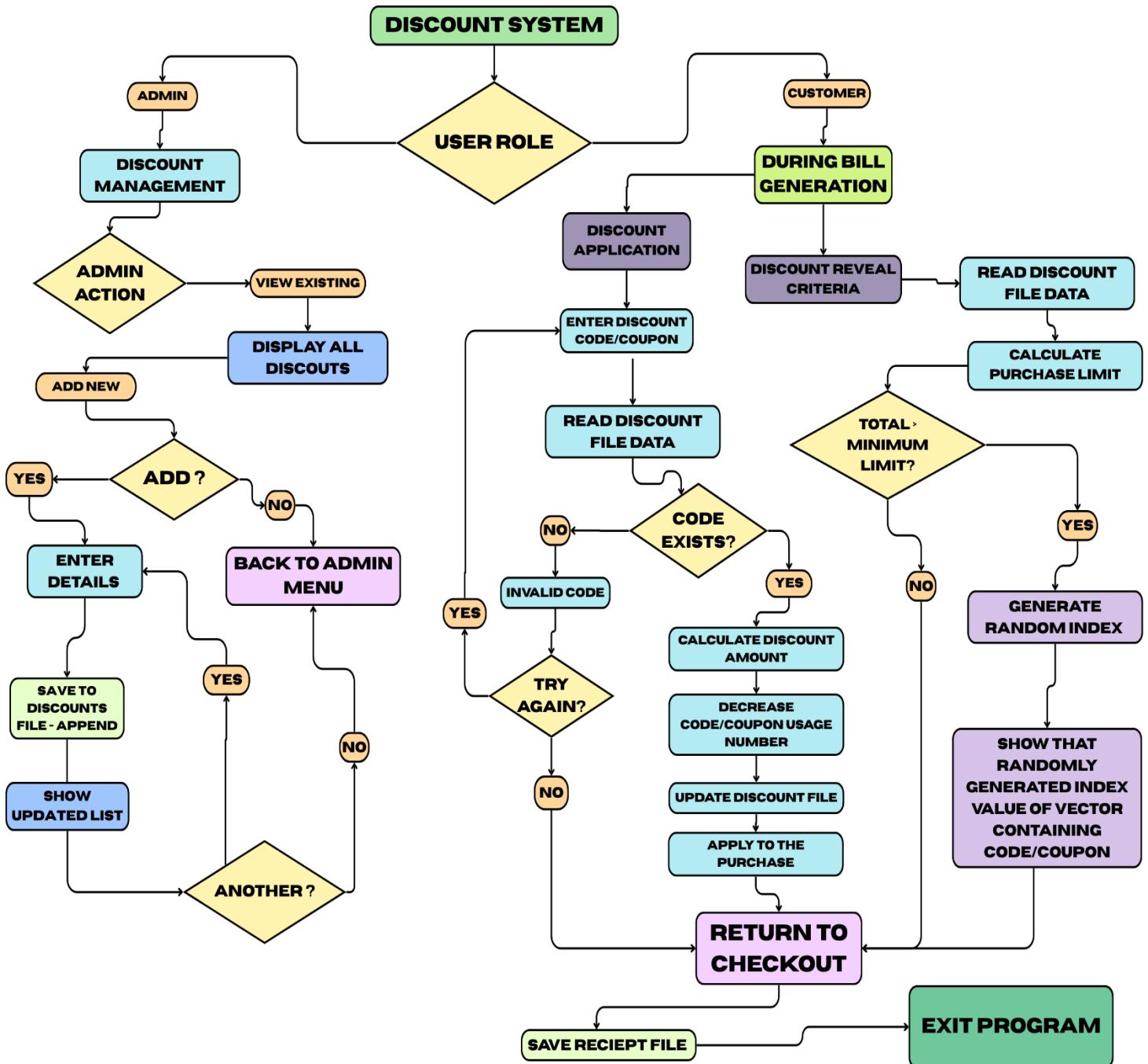
Shopping Process Flow

This below workflow diagram explains clearly how the module of shopping system is working. User start with selecting a category and then adds as much products as he wants then he proceeds to the checkout after going onto the show cart. This below diagram is used to visualize how it's being done in the backend:
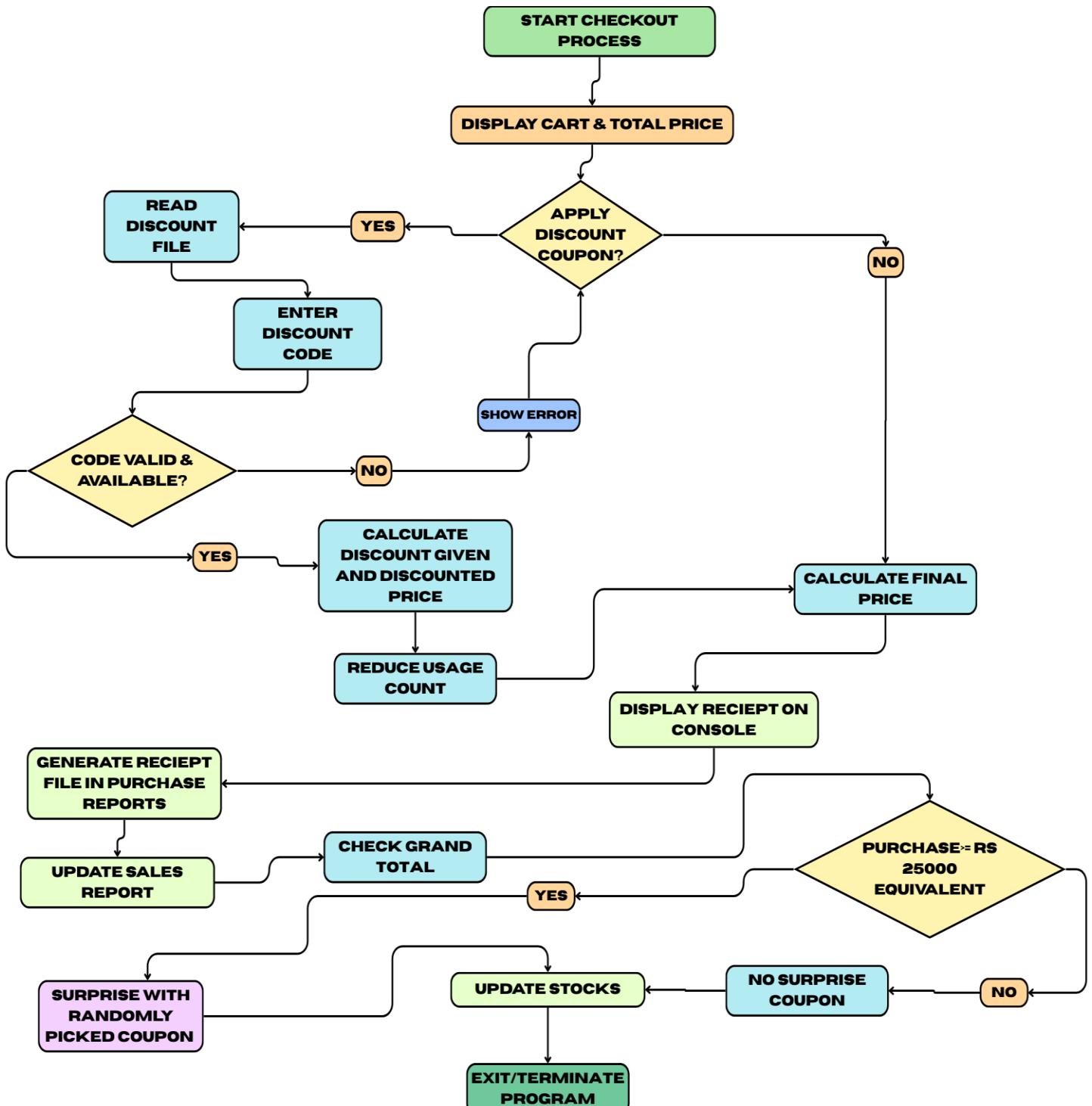
Discount System Workflow

This Discount System and its application is based on the concept of User Engagement and Experience. This discount may help in retaining customer on whether Web-based or mobile based App. Below is its workflow diagram that explains how it is revealed to the user and how do the Admin Set-ups these codes in just one flowchart though both Admin and Customer sides aren't connected to one another in any way for this Misc module. See Universal Diagram:
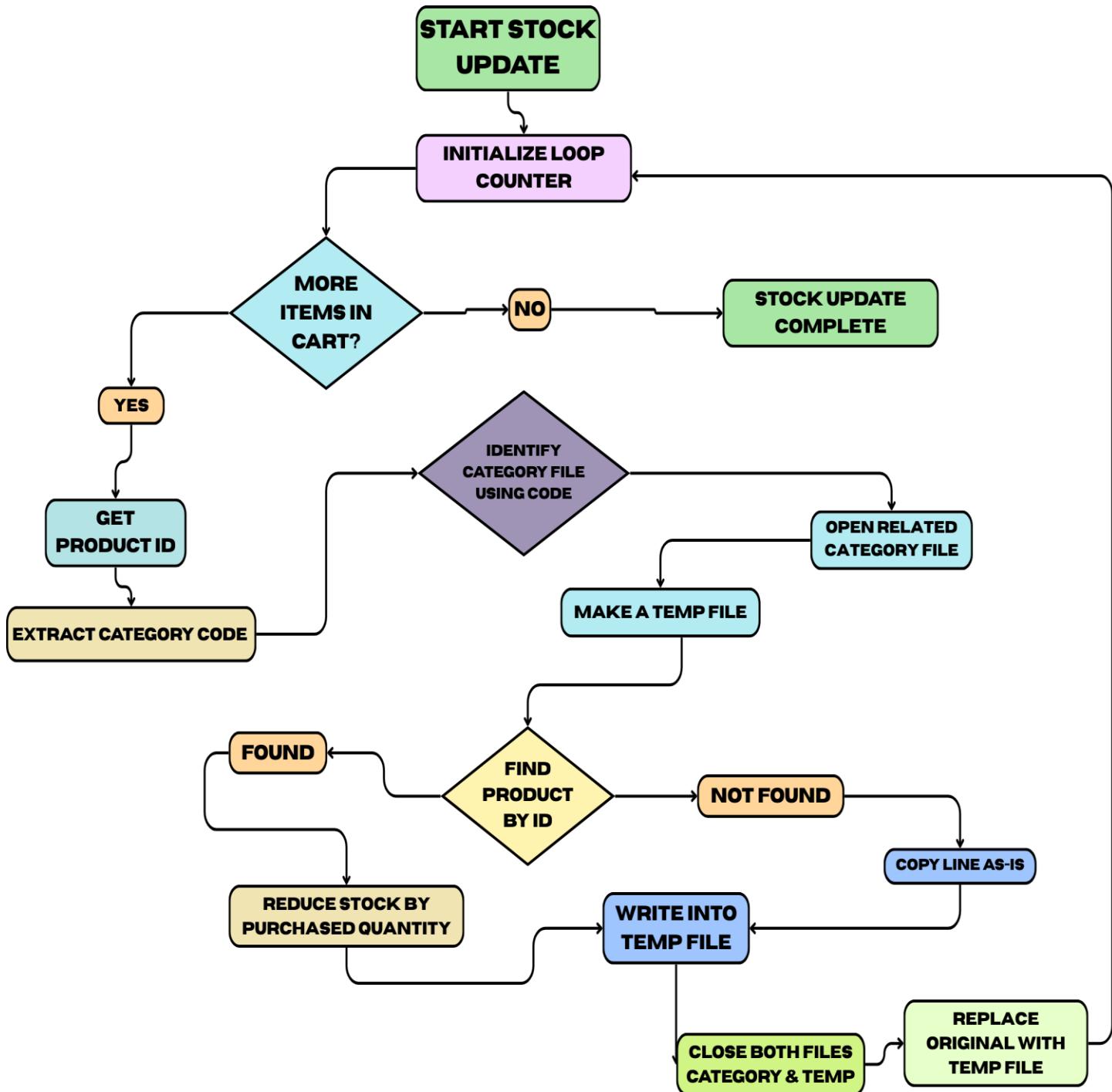
Checkout Process Workflow

The checkout Process start with first displaying the products user added to the cart after that he is questioned about the Discount Coupon/Code, if It's valid discount will be applied and then displayed on the console after that whole data will be appended to the file and then the stock will be updated. And sales data will be appended to the Sales file so that Admin can review it later.
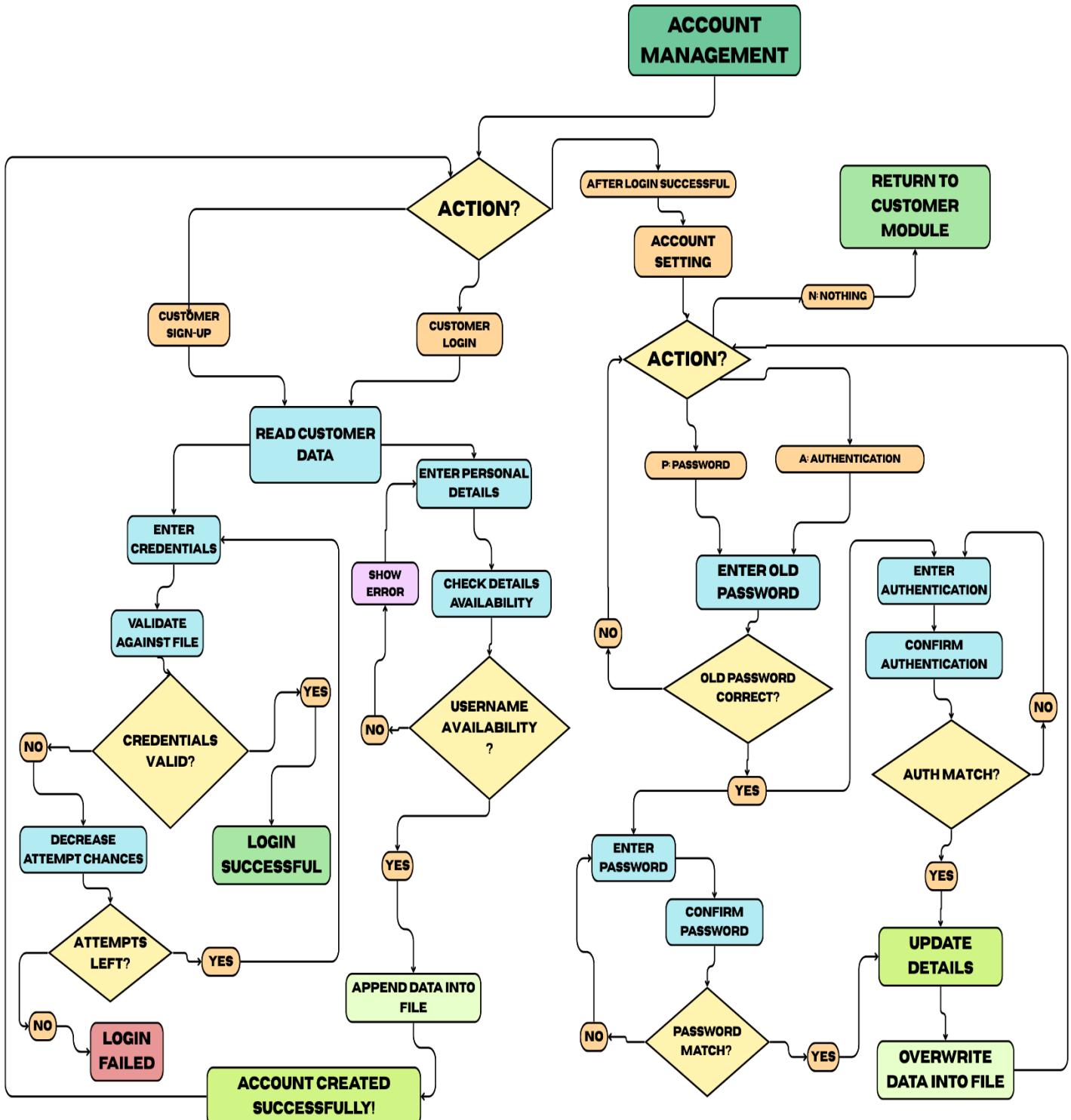
Stock Updating Process

After applying a discount, the stock update process iterates through each product ID in the shopping cart. The size of the cart determines the loop count. Each ID is broken down to identify a category prefix, which is then used to select the correct product file. The system finds the specific product's position in that file and rewrites its stock quantity to reflect the purchase.

Account Management Workflow

This Is the whole working that explains the whole working of Multiple customers' accounts Management. How the sign Up is done and how the Login system works Plus the Additional step that the user can perform is to change his password and Authentication Key!

Key Features & Functions

Admin Features

1. **Authentication**: Secure 3-step login (Name, Password, Authorization)

2. **Product Management**:

    o **Add products with auto-generated IDs**

Before:

After:

   o **Remove products by ID**

Before:

```
Existing Products in this Category are:
ID              Name                            Price     Stock
-----------------------------------------------------------------
DH-1            Steel-Nails-Pack                500       150
DH-2            Hammer                          1500      50
DH-3            Wrenches-Set                    3500      40
DH-4            Screw-Drivers-Set               3000      45
DH-5            First-Aid                       2500      35
DH-6            Adhesive-Tape                   350       100
DH-7            Drill-Nozzeles                  2500      35

Now, Enter the Product you want to remove from the file,
 Beware you have to write the ID(Ex. CBX-1) correctly as it's case sensitive: dh-1|
```

After:

```
Existing Products in this Category are:
ID              Name                                Price       Stock
-----------------------------------------------------------------------
DH-1            Hammer                              1500        50
DH-2            Wrenches-Set                        3500        40
DH-3            Screw-Drivers-Set                   3000        45
DH-4            First-Aid                           2500        35
DH-5            Adhesive-Tape                       350         100
DH-6            Drill-Nozzeles                      2500        35

Product Removed Successfully!
Do you want to remove any other product(Y/N): |
```

o **Update product details**

Before:

```
Existing Products in this Category are:

ID          Name                    Price     Stock


-------------------------------------------------------------

SB-1        Blue-Pen-(set-of-12)     450       100

SB-2        Ballpoint-Pen-(12-black) 450       100

SB-3        Lead-Pencil-(12pieces)   350       100
```

```
Now, Enter the Product by ID, that you want to edit
Note: the ID of Product cannot be changed
Enter ID:  sb-2
-------------------------------------------------------------
Do you want to Rewrite Product Name(Y/N): y

Enter Updated Name: Black Pen (set of 12)

Do you want to Change Product Price(Y/N): n

Do you want to Add more Stock(Y/N): n
```

After:

```
Existing Products in this Category are:

ID          Name                                    Price     Stock

--------------------------------------------------------------------

SB-1        Blue-Pen-(set-of-12)                     450      100

SB-2        Black-Pen-(set-of-12)                    450      100

SB-3        Lead-Pencil-(12pieces)                   350      100
```

- o View all products by category – Just Read the data of Category FIles

3. **Inventory Control**:

   - o Automatic low stock detection (≤5 items)

   - o Zero stock notification

```
D:\coding\C++_Project\Shop|   X     +   ∨

---------------------- LOW STOCK REPORT ----------------------

ID          NAME                                   Price     Stock


All Products from each Category have sufficient Stock!
Press any key to continue . . .


Going onto the Previleges Window!
Press any key to continue . . . |
```

4. **Sales & Reports**:

   - o View sales transaction history

   - o Monitor customer purchases

```
---------------------------------------- Sales Report Window ----------------------------------------------------

Reading the Data of Sales Report. Please wait!
Press any key to continue . . .
Name: Abdullah-Mughal              Grand_Total: 116.07
Name: saad-hassan                  Grand_Total: 8100.00
Name: Talha-Adnan                  Grand_Total: 21.24
Name: Affan-Farooq                 Grand_Total: 260.96
Name: Ebad                         Grand_Total: 4200.00
Name: Abdullah-Mughal              Grand_Total: 215.11
Name: Ebad                         Grand_Total: 145.65          Currency Type: Euro
Name: Affan-Farooq                 Grand_Total: 49.55           Currency Type: Dollars
Name: Zain-Ul-Abiden               Grand_Total: 364.58          Currency Type: Dollars
Name: Huzaifa-Abdur-Rahman         Grand_Total: 71000.00        Currency Type: PKR
Name: Abdullah-Mughal              Grand_Total: 493.77          Currency Type: Dollars
Name: Abdullah-Mughal              Grand_Total: 71.16           Currency Type: Euro
Name: Zain-Ul-Abiden               Grand_Total: 409.65          Currency Type: Euro


--------------------------------------------
    END OF SALES REPORT
--------------------------------------------
Press any key to continue . . . |
```

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5. **Discount Management**:

    o   Create and manage discount coupons

    o   Set usage limits

```
-------------------- Introduce New promo/Discout Coupon Window ---------------------------------
Existing Discount or promo codes are:
ProPakistani      10      24
HappyFriday       20      4
WinterSpecial     5       50
SummerSpecial     5       50
StayAtHome        10      30
IndependenceDaySpecial  15      5
CrazyPakistani  7.5       23
HappyChristmas  10        50

Enter A new Discount or promo code (Ex. IFellForIt, avoid spaces): PresentDay

How much Discount or promo it'll offer to a customer(can be 2.5, 7.5 etc): 10
How much customers can avail it on basis of Come First, Served First(like 10 / 20 / 50): 18

New Code is now added to the Discount file!
```

Customer Features

*   **Account Management**:

    o   New account creation

    o   Secure login system

```
------------------------- Customer Login Interface --------------------------------------
Choose your MEthod
Method                  Keyword
Login                       L
SignUp                      S

 Your Choice: L

Enter your name: Zunaira

Enter Password: zunaira123

Enter your Unique Authorization: CS Assistant

You are an authorized Personnel
Press any key to continue . . . |
```

    o   Password and authorization updates

```
------------------------------- Account settings -----------------------------------
Operation                   Keyword
Change Password             P
Update Authorization        A
Nothing                     N

Your choice: |
```

- **Shopping Experience**:

  o Multi-currency support (USD, EURO, PKR)

```
------------------------------------ Currency Mode Setting -------------------------------------
Before moving further,
Please tell us in what currency would you like to see products prices and bills?
Note: The selection can only be made between USD / EURO / PKR(default)

Currency              keyword
USD                      1
Euro                     2
PKR                      3

Your Choice: 1
currency mode set!

Press any key to continue . . . |
```

  o Category-based product browsing

```
--------------------------------------- Shopping and Adding to Cart---------------------------------------
Select Product Category:

Categories                    Keyword

Computer and Electronics        1

Beverages                       2

Kitchen Accessories             3

Diy & Hardware                  4

Sports and Outdoors             5

Bedroom Equipment               6

Stationery and Books            7

Bath/Wash-room Equipmment       8

Beauty and Personal Care        9

Perfumes and Fragrances         10

Enter your choice: |
```

```
Product ID   Product Name                      Price           Stock Available
----------------------------------------------------------------------------------
CE-1         Audionic-Headphones               30.09           33
CE-2         Gaming-Keyboard/mouse             24.78           96
CE-3         Bluetooth-Speakers                26.55           42
CE-4         Fast-Charger-33W-Ctype            15.93           46
CE-5         Zero-headphones                   28.32           43
CE-6         Apple-buds                        44.24           35
CE-7         VGA-HDMI-Converter                1.77            150
CE-8         HD-TV-Monitor-33'Inch             477.84          14
CE-9         16gb-DDR5-RGB-RAM                 19.47           50
CE-10        RTX-3090-Graphics-Card            265.47          25
CE-11        Laptop-Cooling-Fan                6.37            75
Enter Product by ID you want to add into your Cart: ce-8

The Product You Have Selected is HD-TV-Monitor-33'Inch

Do you want multiple items? (Y/N) n

Product added to the Cart!
```

  o Real-time cart management

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```
------------------------------- Shopping Cart List -------------------------------
ID          NAME                              PRICE     QUANTITY      TOTAL PRICE
CE-8        HD-TV-Monitor-33'Inch             477.84    1             477.84
BPC-1       Face-Masks                        1.59      15            23.89

Total Price is 501.73

End of Cart List
-------------------------------------------------------------------------------

You can directly Perform the Following Actions:

    Action                      Keyword

Proceed To Checkout               P

Remove Product                    R

Go Back                           E

Your Choice: |
```

```
------------------------------- Shopping Cart List -------------------------------

ID          NAME                              PRICE     QUANTITY      TOTAL PRICE
CE-8        HD-TV-Monitor-33'Inch             477.84    1             477.84
BPC-1       Face-Masks                        1.59      15            23.89

Total Price is 501.73

End of Cart List

-------------------- Remove Something from cart --------------------

Enter Product by ID that you want to remove from your Cart: BPC-1

You've Selected the Product: Face-Masks

Do You want to DO with this Product?
Remove Whole Product          Press W
Remove Some of the Quantity       press S

Your Choice: s

Enter Number of items you want to remove of this product: 8|
```

```
------------------------------- Shopping Cart List -------------------------------

ID          NAME                              PRICE     QUANTITY      TOTAL PRICE
CE-8        HD-TV-Monitor-33'Inch             477.84    1             477.84
BPC-1       Face-Masks                        1.59      7             23.89

Total Price is 501.73

End of Cart List


The Product has been successfully Removed/Updated from the Cart!
```

- **Checkout System**:

  o Cart review and editing

  o Discount code application

  o Automatic receipt generation

  o Surprise coupon generation for large purchases

```
Customer Name: Zunaira
------------------------------------------------------------------------
------------------ Items Bought! ----------------------
------------------------------------------------------------------------
NAME                          PRICE           QUANTITY          TOTAL PRICE
HD-TV-Monitor-33'Inch         477.84          1                 477.84
Face-Masks                    1.59            7                 23.89

End of List!
------------------------------------------------------------------------
Grand Total: 501.73

------------------------------------------------------------------------
Do you have a discount coupon (Y/N): y
Please Enter your Discount Coupon: HappyFriday

Total Discount Given: 100.35

Grand Price After Discount: 401.39
Your Reciept has been Generated Successfully!

Thanks for Shopping From Us!

A COPY of your Reciept has been Saved Successfully in our storage!

Just some little steps to be done and you're good to go!

For Purchasing over 88.49, Equivalent to Rs 25000,
You've Won a discount coupon to be used next time:
IndependenceDaySpecial

Make Sure to Remeber this also the wording in Lower & Upper case
```

Universal Features

1. **Currency Conversion**: Real-time price conversion

2. **File-based Persistence**: All data stored in text files

3. **Error Handling**: Input validation and file operation checks

4. **User-friendly Interface**: Clear menus and prompts

Technical Implementation Detail

Key Algorithms

1. **Auto ID Generation**: ShortCode + "-" + to_string(count);

2. **Low Stock Detection**: Iterates through all category files

3. **Cart Management**: Vector-based dynamic storage

4. **Discount Application**: Percentage-based calculation

Error Handling

- File operation validations

- Input type checking

- Stock availability verification

- Duplicate username prevention

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```
----------------------- Make a new Account -----------------------------------

Enter the details asked!

Enter your Name: Ebad
This User Name Already Exists. Please try a different one

Enter your Name:
```

Admin Testing

1. **Login Test**: Verify authentication with correct/incorrect credentials

2. **Product Management**: Add, remove, and update products

3. **Stock Check**: Verify low stock detection accuracy

4. **Sales Report**: Generate and view sales data

Customer Testing

1. **Account Creation**: Test duplicate username prevention

2. **Shopping Flow**: Complete purchase from selection to receipt

3. **Cart Operations**: Add, remove, and update cart items

4. **Currency Conversion**: Test different currency displays

5. **Discount Application**: Apply valid and invalid discount codes

Conclusion

This project demonstrates comprehensive application of C++ programming fundamentals including:

- File I/O operations

- Data structures (structs, vectors)

- Control structures

- Functions and modular programming

- User interface design

- Error handling

- Real-world problem solving

The system provides a solid foundation for an inventory management and e-commerce system with potential for expansion into a full-featured commercial application.

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