Sultan Qaboos University

College of Science : Department of Computer Science

Mobile Application Development (COMP4206)

Scan and Go – Smart Shopping Assistant

Part 1

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1.Project Overview and Objectives:

Overview :

The "Scan and Go" app is a mobile application that makes shopping easier and faster. Users can scan barcodes of products while shopping, add them to a virtual cart, and see the total price instantly. They can pay through the app without waiting in line. The app also shows discounts, product reviews, and helps users find their way in the store. It saves time and makes shopping more convenient.

Objectives:

1. Allow users to scan products and add them to a virtual cart easily.
2. Provide instant updates on the total price of items.
3. Enable users to pay directly through the app.
4. Show available discounts and product reviews.
5. Help users navigate the store with a simple map.
6. Save scanned items and payments in a secure database

2.Target Audience and Stakeholders :

User Groups:

1. Customers: Shoppers who want a faster and easier shopping experience.
2. Store Managers: People who manage the app, track sales, and improve the service.
3. Store Owners: Business owners who want to attract more customers and make shopping smoother.
4. Cashiers : Employees who help users if they face issues with the app.

Interviews with Stakeholders:

To gather useful information and make the app better, I interviewed two stakeholders: a customer and a store manager. The goal was to understand their needs, expectations, and suggestions for the 'Scan and Go' app.

Interview 1: Customer (Sarah)

Purpose: To understand the shopping experience from a customer's point of view.

Q1: What do you find most frustrating when shopping in stores?
Sarah: I hate waiting in long lines, especially during busy hours. It makes the shopping experience very annoying.

Q2: Would you prefer using an app to avoid waiting in line? Why?
Sarah: Yes, definitely! It would save a lot of time and make shopping much easier.

Q3: What features would you like to see in the 'Scan and Go' app?
Sarah: I want it to be simple and easy to use. Showing discounts and reviews would be very helpful, too.

Q4: How important is it for you to see discounts and product reviews while shopping?
Sarah: It’s very important. It helps me decide what to buy and saves money.

Q5: What improvements would make the app more useful for you?
Sarah: Just keep it simple and clear, with easy navigation and fast payment options.

Interview 2: Store Manager (Ahmed):

Purpose: To understand the needs of store management and how the app can help.

Q1: What challenges do you face when managing customers during peak hours?
Ahmed: Handling large crowds and slow payment processes are the biggest issues. It’s stressful and affects customer satisfaction.

Q2: How do you think the 'Scan and Go' app can help improve the shopping process?
Ahmed: It can make the checkout process faster and reduce waiting time, which will make customers happier.

Q3: What features should be included to make the app useful for your store?
Ahmed: Secure payment options, accurate sales tracking, and the ability to promote discounts and special offers.

Q4: How important is it to have a secure and reliable system for tracking sales?
Ahmed: Very important. The app needs to be reliable and make sure all sales are recorded correctly.

Q5: What improvements would you suggest for the app?
Ahmed: Adding notifications for promotions and making the interface user-friendly for all ages.

3. Comparative Analysis of Similar Mobile Applications/Websites :

1. Amazon Go

https://www.amazon.com/b?node=16008589011

Structure:

Amazon Go is a cashier-less store concept that uses AI, sensors, and cameras to track purchases and automatically charge customers.

Main Features:

- Automatic checkout
- No manual scanning
- Store navigation via AI and sensors

Limitations:

- Requires specialized infrastructure
- Not available in many stores
- Privacy concerns

Comparison:

Amazon Go uses advanced tech that requires expensive AI systems and cameras. Our "Scan and Go" app is more affordable and works in any store with barcode scanning, which is simpler and doesn't raise privacy issues. Additionally, Amazon Go only supports Amazon Pay, whereas our app offers more payment options like credit cards and PayPal.

2. Walmart Scan & Go

https://www.walmart.com/

Structure:

Walmart Scan & Go allows users to scan items and pay directly via the app, skipping checkout lines.

Main Features:

- Barcode scanning
- Real-time price updates
- In-app payments

Limitations:

- Limited to Walmart stores

- Requires QR code verification at checkout
- Some items need manual verification

Comparison:

Walmart Scan & Go is only available in Walmart stores, while our app works in any retail store. It also lacks store navigation, which our app provides. Additionally, our app speeds up the checkout process with QR verification at the exit, whereas Walmart requires verification at a self-checkout station. Lastly, our app supports more payment options, giving users greater flexibility.

4. Application Features and Functionalities :

1-Barcode Scanning

Functionality: Scan product barcodes with your phone.
Goal & Stakeholders: This feature saves time for users by quickly adding products to their cart, reducing the need for manual entry. It also benefits retailers by improving the checkout process and reducing errors.

2- Real-time Price Updates

Functionality: Updates the total cost as items are scanned.
Goal & Stakeholders: This provides transparency for users, helping them manage their budget. Retailers benefit by keeping customers informed about their spending, which can improve customer satisfaction.

3- Multiple Payment Options

Functionality: Supports credit cards, Google Pay, PayPal, etc.

Goal & Stakeholders: This feature makes the app accessible to a wider audience by offering payment options that users prefer. It also benefits retailers by increasing the likelihood of completing a purchase with flexible payment methods.

4- Store Navigation

Functionality: Helps users find items in-store with a map.

Goal & Stakeholders: This feature enhances user experience by reducing the time spent searching for products. It also benefits retailers by improving store efficiency and reducing customer frustration.

5- Instant Checkout and Exit Verification

Functionality: Checkout instantly with a QR code for verification.

Goal & Stakeholders: Users can avoid long checkout lines, which saves them time. Retailers benefit from faster customer turnover and more efficient operations.

6- Personalized Discounts

Functionality: Shows discounts based on user preferences.

Goal & Stakeholders: This feature increases customer satisfaction by offering deals relevant to their shopping habits. It also drives sales for retailers by encouraging more purchases through personalized offers.

7. Mobile Application Logo design :

Colors:

- The blue falcon symbolizes trust, reliability, and intelligence—important values for a tech-based shopping app.
- The black barcode elements give a professional touch and highlight the scanning feature.
- The blue "&" represents connection and smooth integration between scanning and shopping.

Shapes and Symbols:

- Falcon Shape: Falcons are known for speed and precision, just like your app helps users shop quickly and easily.
- Barcode in the Wings: This reinforces the idea that the app is based on smart barcode scanning.
- Smooth, flowing lines: The curved design makes the logo look modern and dynamic, just like the fast and easy experience your app provides.

Typography (Font Style):

- Bold, sans-serif font gives a clean and modern look, making it easy to read.
- Black and blue contrast in "Scan & Go" makes the name stand out, while the blue "&" highlights the smooth connection between scanning and shopping.

How It Matches the App's Identity and Values:

- Speed and convenience → Shown by the flying falcon.
- Technology and innovation → Represented by the barcode and modern font.
- Trust and efficiency → Expressed through the blue color and professional design.

8.Application Screen Design and Description:

1. Splash Screen

The splash screen is the first screen users see when they open the app. It shows the Scan & Go logo with a simple animation and stays for a few seconds before moving to the next screen. This screen gives a good first impression, makes the app look professional, and prepares users to use it. The design has a centered logo, a plain background with app colors, and a loading animation (optional).

2. Login / Signup Screen

The login/signup screen lets users log in using email, phone, or social media. New users can sign up by adding their details. There is also a Forgot Password? button to help users reset their passwords. This screen keeps accounts secure and saves shopping history for users. The design includes text boxes for email/phone and password, Login & Signup buttons, and social media login options like Google, Apple, and Facebook.

3. Home Screen (Main Page)

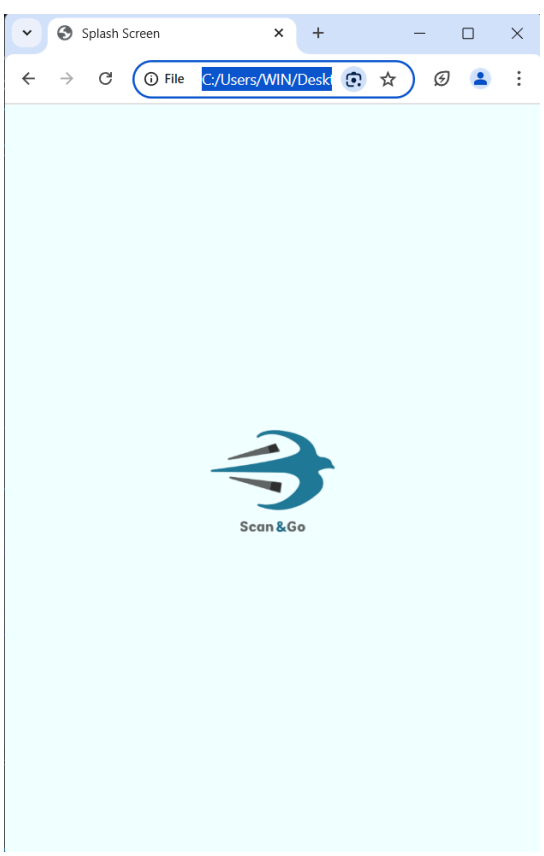
The home screen shows product categories, a search bar to find items quickly, and a scan button for barcode scanning. It also displays recent purchases and suggested items. This is the main page of the app, helping users find products easily and offering personalized suggestions. The design includes a search bar at the top, a big scan button in the center, and product categories and recommendations below.

4. Barcode Scanner Screen

The barcode scanner screen uses the phone’s camera to scan product barcodes and shows product details like name, price, and stock. Users can add items to their cart instantly. This feature makes shopping faster, removes the need to search for products manually, and gives instant product details. The design has a camera view with a scanning box, live scanning status, and a product details popup with an "Add to Cart" button.

5. Checkout & Payment Screen

The checkout and payment screen shows all selected items, allows users to apply discount codes, offers different payment methods (card, digital wallets, cash on delivery), and creates a QR code receipt for easy store exit. This screen makes checkout quick and easy, helps users pay securely, and reduces waiting time at the store. The design includes a list of items with total price, a discount code box, payment options, and a big "Confirm Payment" button.


Splash Screen
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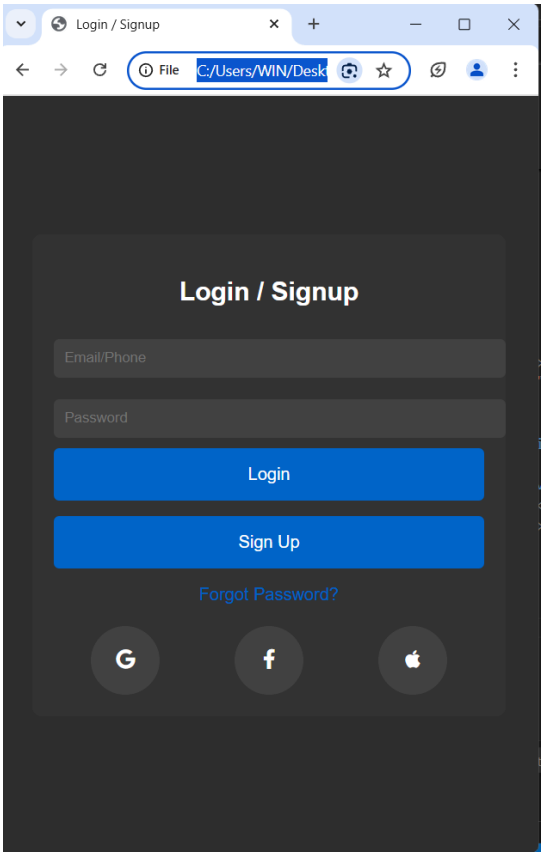
Scan &Go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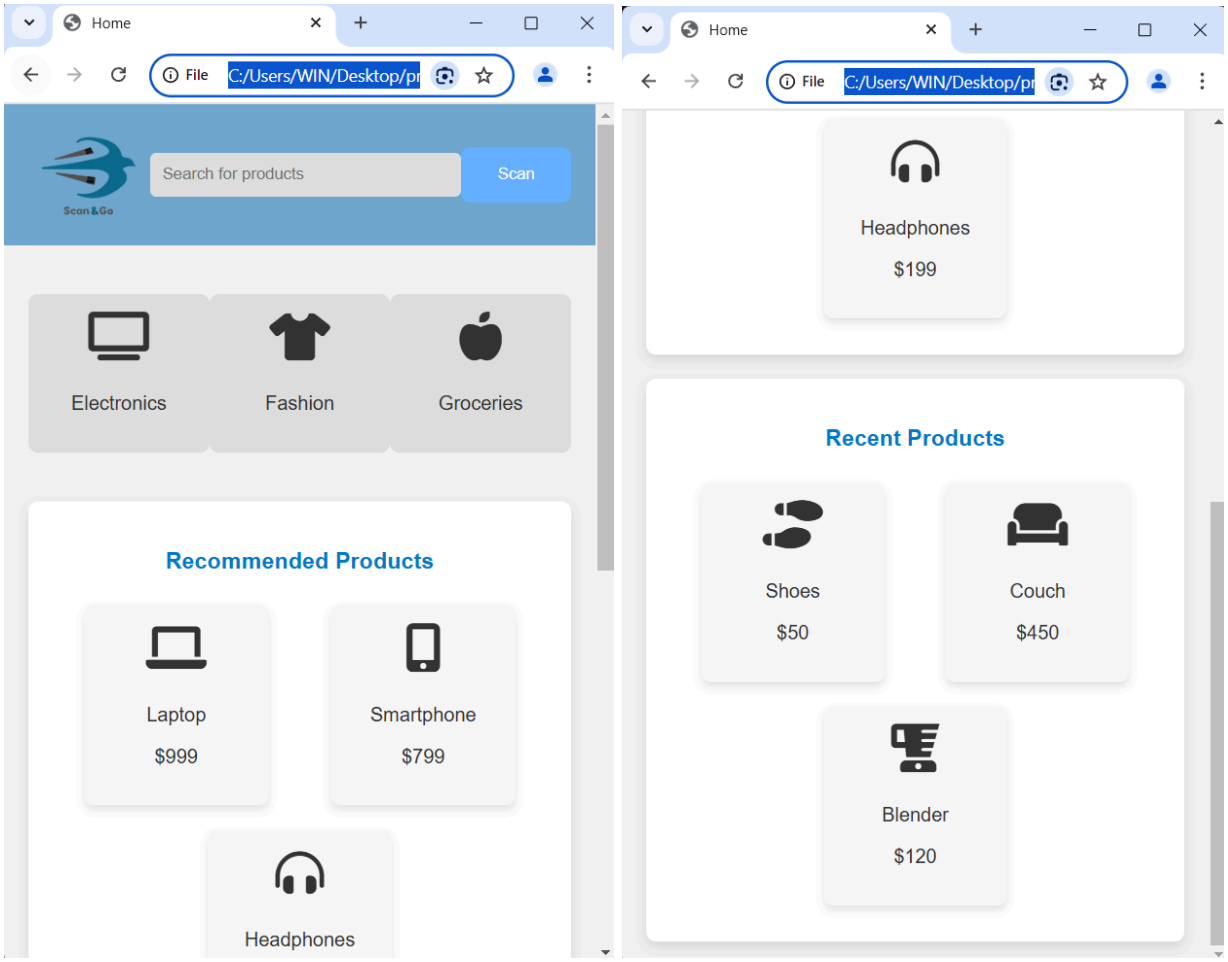
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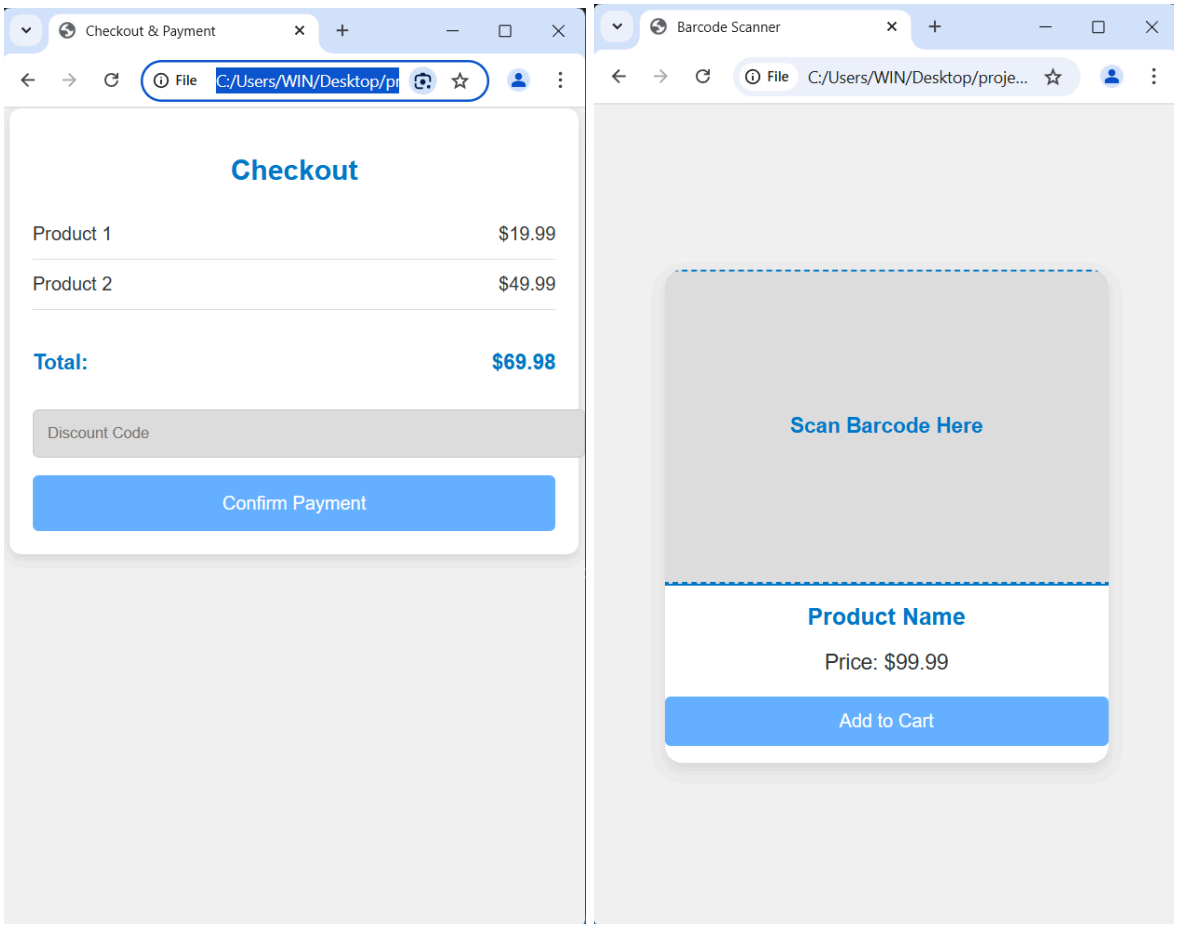


9. Database Design and Data Management

Types of Data Managed by the Application:

The "Scan and Go" app manages three main types of data:

- User Data: Includes user information such as Username, Email, Encrypted Password, Payment Method, and Purchase History.
- Product Information: Contains details like Product Name, Barcode, Price, Discounts, and Reviews.
- Purchase Data: Stores information about the purchase, including UserID, ProductID, Total Price, Payment Status, and Date/Time of the purchase.

ProductID	ProductName	Barcode	Price	Discount	Reviews
1	Milk	123456789012	1.50	10%	Good quality.
2	Bread	987654321098	0.75	None	Fresh and tasty.
3	Milk	123456789012	1.50	10%	Good quality.
4	Bread	987654321098	0.75	None	Fresh and tasty.

PurchaseID	UserID	ProductID	TotalPrice	PaymentStatus	DateTime
1	1	1,2	2.00	Completed	2025-03-17 10:00:00
2	2	1	1.35	Completed	2025-03-17 11:00:00
3	1	1	1.50	Completed	2025-03-17 10:00:00
4	1	2	0.75	Completed	2025-03-17 10:00:00
5	2	1	1.50	Completed	2025-03-17 11:00:00

UserID	Username	Email	Password	PaymentMethod	PurchaseHistory
1	Sarah	sarah@email.com	98ds7f4w6d8s	Credit Card	1,2
2	Ahmed	ahmed@email.com	7s8d9f5s6d4s	Wallet	1
3	Sarah	sarah@email.com	98ds7f4w6d8s	Credit Card	1,2
4	Ahmed	ahmed@email.com	7s8d9f5s6d4s	Wallet	1
5	Sarah	sarah@email.com	98ds7f4w6d8s	Credit Card	1,2
6	Ahmed	ahmed@email.com	7s8d9f5s6d4s	Wallet	1

Data Exchange and Security Measures:

1. Data Exchange:

- When users scan a product, the app sends a request to the database to retrieve the product’s details (name, price, discount).
- When users proceed to payment, the app updates the "Purchases Table" to save the transaction details.
- Users can view their previous purchases from the "Users Table" by retrieving their Purchase History.

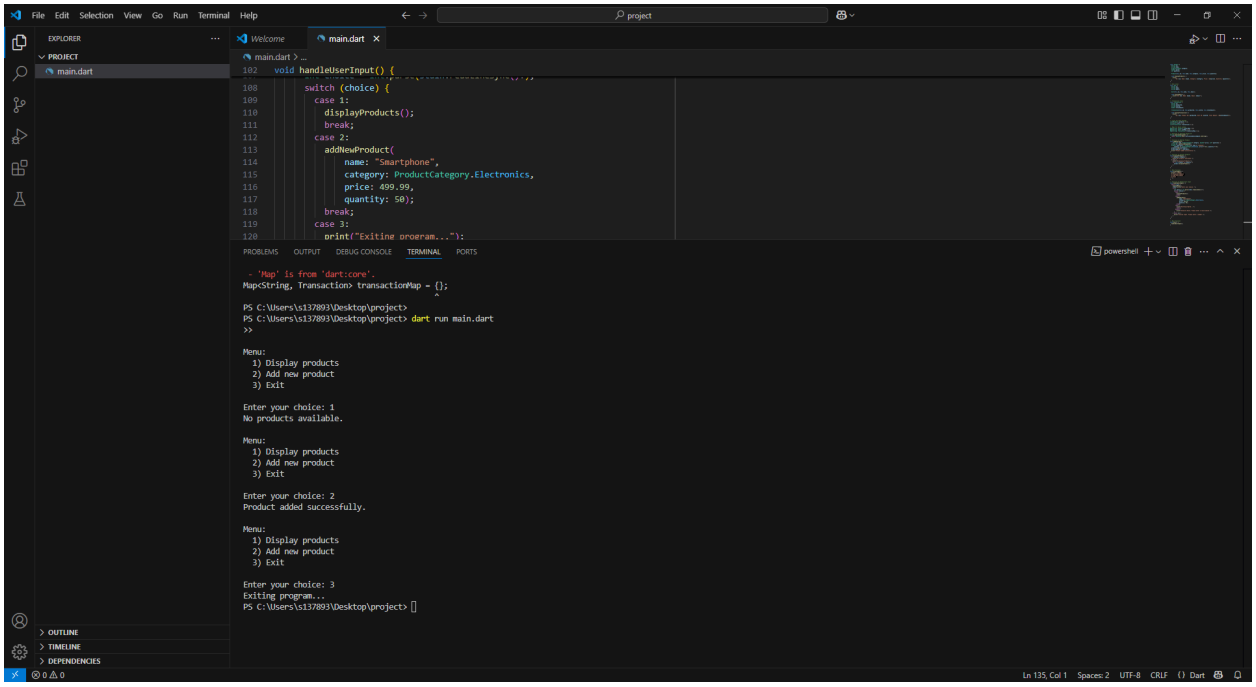
2. Security Measures:

- Encryption: User passwords are encrypted before being saved in the database to ensure privacy.
- Authentication: Users must log in using their credentials to access their accounts.
- Access Control: Only authorized users (e.g., store managers) can access certain data like sales reports.

PART B: IMPLEMENTATION USING DART CONSOLE APPLICATION AND MOBILE APPLICATION

1. Application Description

The Dart Console application is designed to store and manage project data for Scan and Go, simulating database management through Lists and Maps. The system will manage three primary data elements: Products, Users, and Transactions. Each element will be represented by a Dart class, and the data will be dynamically stored and manipulated through user input. Users can interact with the system through a menu-driven interface, making operations like adding, deleting, and updating data simple and intuitive.



Flutter-Based Mobile Application - Scan & Go

1. Application Overview

The Scan & Go application is designed to improve the shopping experience by allowing users to scan products and add them to their cart easily. The application provides a simple and structured user interface that displays product details and enables smooth interaction.

2. Features and Functionalities

- Product Listing: Displays products in a scrollable list with details such as name, price, and image.
- Add New Products: Users can add new products through an input form.
- Product Categorization: Products are categorized into different types, such as electronics, clothing, and groceries.
- Interactive UI: Includes buttons, images, text fields, and icons for user interaction.
- Temporary Data Storage: The application stores product information during usage.

3. UI Design and Structure

Used Widgets:

- ListView for displaying products in a scrollable format.
- TextField for user input when adding products.
- ElevatedButton for performing actions such as adding a product.
- Card for structuring product presentation.
- Divider and Padding for layout organization.
- AppBar for application title and navigation.

Styling and Theming:

- Applying ThemeData for a consistent design.
- Using Material Design components to enhance the user experience.
- Ensuring a clean and visually appealing layout.

4. Code Structure and Refactoring

To maintain code efficiency and readability, the application follows a structured approach:

- models/: Contains product and user data structures.
- screens/: Contains different application pages.
- widgets/: Contains reusable UI components.

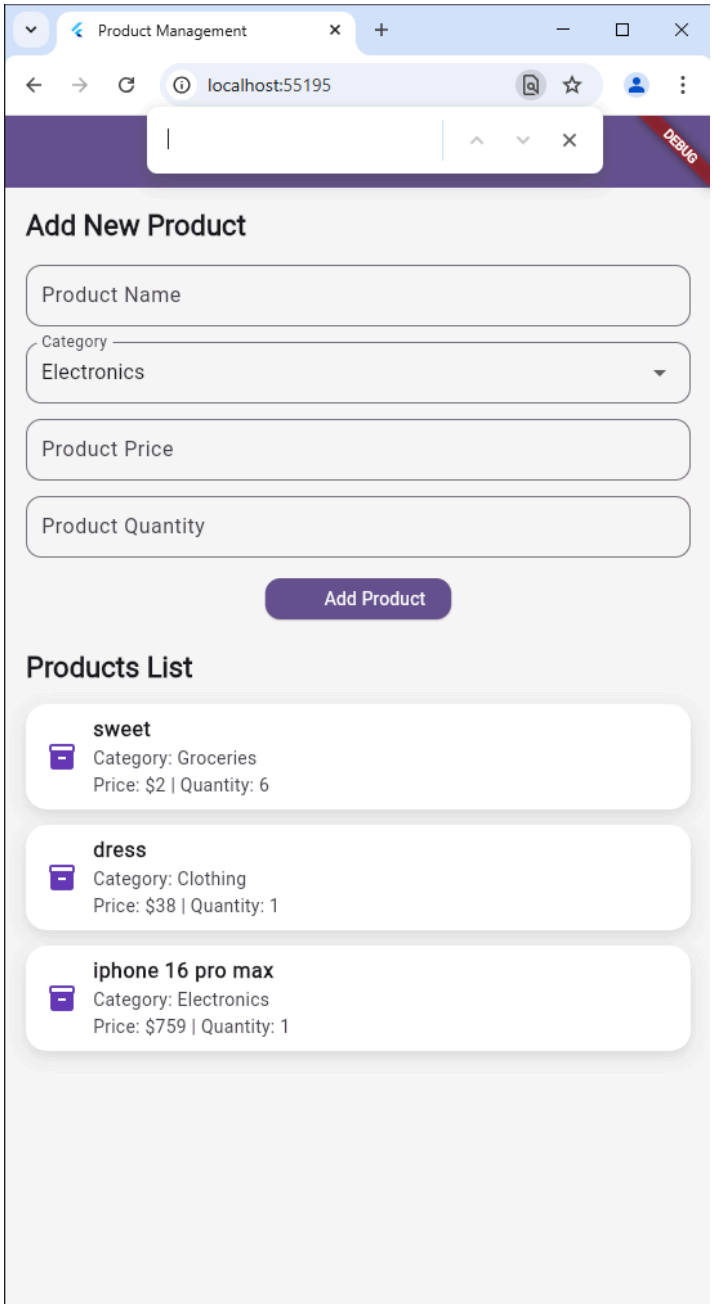
Additionally, refactoring techniques such as constants, methods, and class-based structures are used to avoid code repetition.

5. Performance and State Management

- Using setState or Provider for efficient state management.
- Implementing local storage (such as Shared Preferences or SQLite) to retain product data when needed.
- Ensuring responsiveness across different screen sizes.

6. Conclusion

The Scan & Go application is designed to provide a smooth and efficient shopping experience. It follows best practices in Flutter development, ensuring a well-structured codebase and a user-friendly interface. The use of Material Design components and refactoring techniques ensures the application is both functional and maintainable.



Part C :Team Work

GitHub Link : https://github.com/ovzev/ScanGo

Team Contribution :

Task Name	Duration	Start	Finish	Predecessors	Resource Names
PROJECT SPECIFICATION	**1 day**	**Tue 3/18/25**	**Tue 3/18/25**		
Overview & Objectives					Reem
Target Audience & Stakeholders					Reem
Comparative Analysis of Similar App/Websites					Asara
Features & Functionalities					Asara
Logo Design					Zainab
Screen Design and Description					Zainab
Database Design and Data Management					ALL
IMPLEMENTATION USING DART CONSOLE APPLICATION AND MOBILE APPLICATION	**1 day**	**Tue 3/18/25**	**Tue 3/18/25**		
Console-Based Dart Application					ALL
Flutter-Based Mobile Application					ALL