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Smart Shop Tracker: An Advanced Retail Shop Management System Using Flutter And Supabase

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Abstract: Retail businesses increasingly require real-time, digital solutions to manage inventory, sales, and customer interactions efficiently. This paper introduces Smart Shop Tracker, an advanced retail shop management application developed using Flutter and Supabase. The system provides features such as inventory control, sales tracking, billing generation, and real-time data updates. With Supabase's scalable backend and Flutter's cross-platform capabilities, the application offers an efficient and modern approach to shop management for small and medium-sized businesses.

Keywords: Flutter, Supabase, Smart Shop Tracker, Retail Management System, Cross-Platform App, Real-Time Sync, Backend-as-a-Service, Inventory System.

I. INTRODUCTION

In today's fast-paced retail environment, efficient management systems are crucial for optimizing operations, reducing manual errors, and improving overall business performance. Traditional methods of recording sales, managing inventory, and generating bills often involve time-consuming manual processes and are prone to inaccuracies. These inefficiencies are especially prevalent in small and medium-sized retail businesses, which frequently lack access to affordable and scalable digital tools that simplify daily operations.

With the growing adoption of mobile technology and cloud-based platforms, modern retail systems can now provide real-time automation, data accuracy, and multi-platform access. The integration of cloud databases and cross-platform development tools has enabled the creation of lightweight, flexible, and secure solutions for retailers.

Smart Shop Tracker is an advanced retail management system developed to address these challenges. The application offers essential features such as inventory tracking, sales monitoring, digital billing, and real-time data synchronization. Built using Flutter, a modern UI toolkit for cross-platform development, and Supabase, an open-source backend-as-a-service platform, the system aims to provide a responsive, efficient, and scalable solution tailored to small and mid-sized businesses. Supabase offers secure authentication, a

PostgreSQL-based real-time database, and cloud storage, ensuring full control over data privacy and operational flexibility.

1.1 Aim & Objectives

Aim:

To develop a lightweight and efficient mobile application for retail shop management using Flutter and Supabase.

Objectives:

- Enable inventory management
- Provide an automated billing system with bill history.
- Integrate Supabase for backend services like authentication, real-time sync, and data storage.

II. TECHNOLOGY OVERVIEW

2.1 Flutter

Flutter is an open-source UI toolkit designed to create natively compiled applications for mobile, web, and desktop using a single codebase. It uses Dart as its programming language and offers features like hot reload, customizable widgets, and flexible UI components.

2.2 Supabase

Supabase is an open-source alternative to Firebase. It includes a PostgreSQL database, real-time subscriptions, authentication services, file storage, and auto-generated APIs. Its SQL-based structure makes it suitable for complex, structured data management, as often needed in retail environments.

III. PROPOSED SYSTEM

The Smart Shop Tracker is designed as a mobile-based retail management system that simplifies day-to-day shop operations like inventory handling, sales tracking, and billing. It leverages Flutter for building a responsive and cross-platform user interface, and Supabase for real-time backend services such as authentication, database management, and cloud storage.

The application offers an intuitive dashboard where shopkeepers can manage products, generate bills, and track sales reports. It eliminates the need for traditional manual record-keeping and enables access to business data anytime, anywhere.

A. System Modules:

- Authentication: Secure login/logout for shop owners Supabase Auth.
- Product Management: Add, update, delete products.
- Sales and Billing: Generate bills with stored history.
- Reports: View daily sales reports.

B. Architecture:

- Frontend: Flutter mobile application.
- Backend: Supabase (PostgreSQL, Auth, Realtime DB).
- Communication: REST API calls for real-time updates.

IV. METHODOLOGY

The application was developed using Flutter and Dart and integrated with Supabase via its client SDK. Supabase's authentication module is used for basic user login functionality. Inventory and billing data are securely managed in Supabase's PostgreSQL database. Real-time features allow automatic synchronization across devices without needing role-based access control, making it simple and straightforward for single-user or small-team use.

V. SYSTEM WORKFLOW DIAGRAM

The system workflow represents the step-by-step process of how users interact with the Smart Shop Tracker app. It outlines the flow from login to accessing features like product management, billing, and sales tracking, while showing how the app communicates with the Supabase backend for real-time operations.

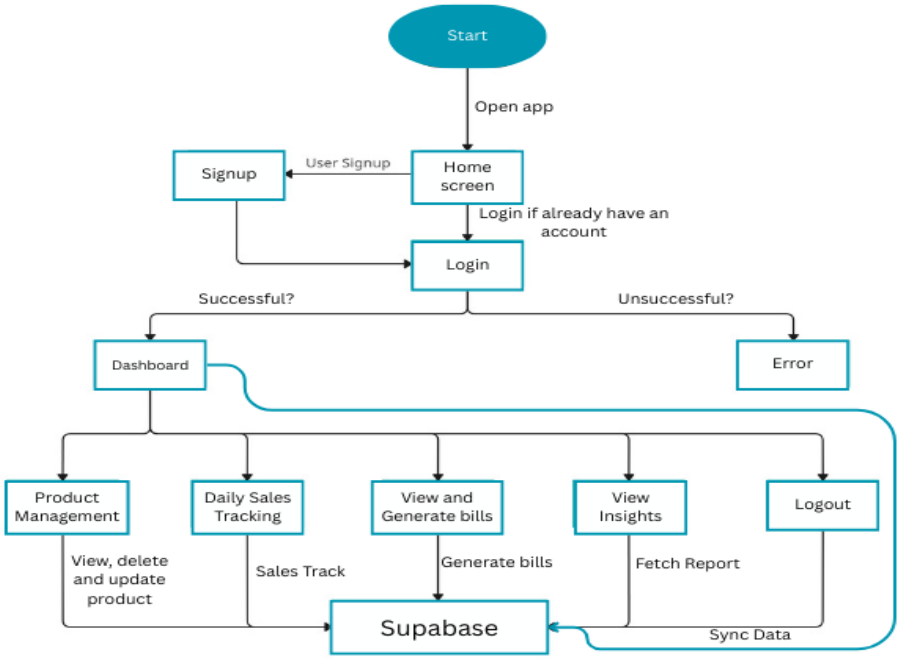

Fig 1: system workflow diagram of smart shop tracker

This diagram illustrates the end-to-end workflow of the Smart Shop Tracker system, starting from user login to navigating through key modules like product management, billing, and sales viewing. It provides a high-level view of the user journey within the application.

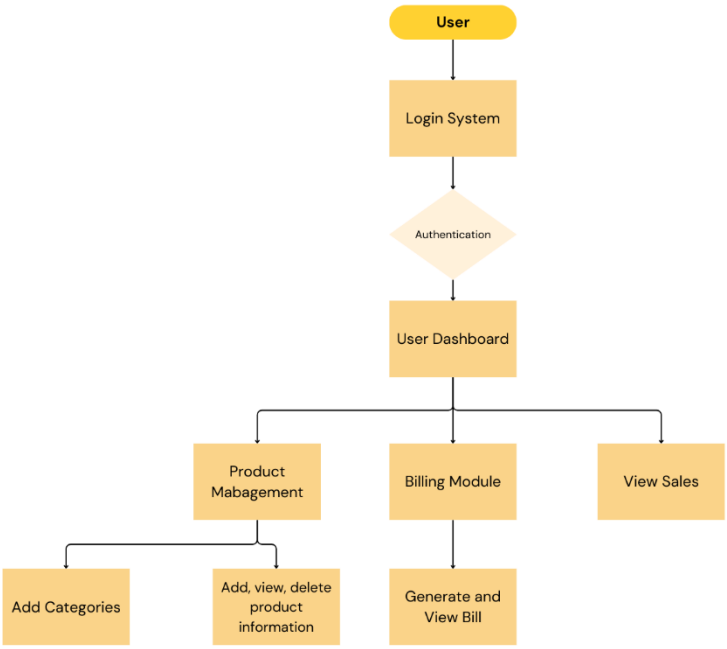

Fig 2: module workflow diagram of smart shop tracker app

This diagram breaks down the core modules of the application, including login, dashboard, product management, billing module, and sales viewing. It highlights the functionalities within each module such as adding categories, managing products, and generating bills.

VI. LITRATURE REVIEW

The Smart Shop Tracker, developed using Flutter and Supabase, draws inspiration from various studies on cloud computing, mobile-based inventory systems, and digital payment integration. This section reviews existing solutions, their contributions, and areas for further enhancement

Page Titles	Author(s) & Year	Outcome/Findings	Relevance to Smart Shop Tracker
“Flutter Based Cross Platform Retail Application”	Wilson et al., 2022	Discussed the advantages of using Flutter for cross-platform retail applications, improving UI and app performance.	Validates the choice of Flutter for frontend development, ensuring a seamless user experience.
"Supabase as a Scalable Backend Solution for Retail Apps"	Rajesh et al., 2023	Explored the use of Supabase as an open-source alternative to Firebase for real-time data synchronization.	Supports real-time inventory updates, authentication, and data security in Smart Shop Tracker.
"Mobile-Based Inventory Tracking System using	Anderson & White, 2018	Proposed a mobile-based inventory tracking system with	Supports remote access and management of stock data using Supabase.

Cloud Technologies"		cloud storage for real-time access	
"Enhancing Retail Efficiency with POS Integration"	Gupta & Sharma, 2020	Discussed integrating POS (Point of Sale) systems with mobile applications for seamless billing and transaction processing.	Useful for integrating billing and payment management into Smart Shop Tracker.

Table 1: review of existing research supporting smart shop tracker development

VII. IMPLEMENTATION SNAPSHOT

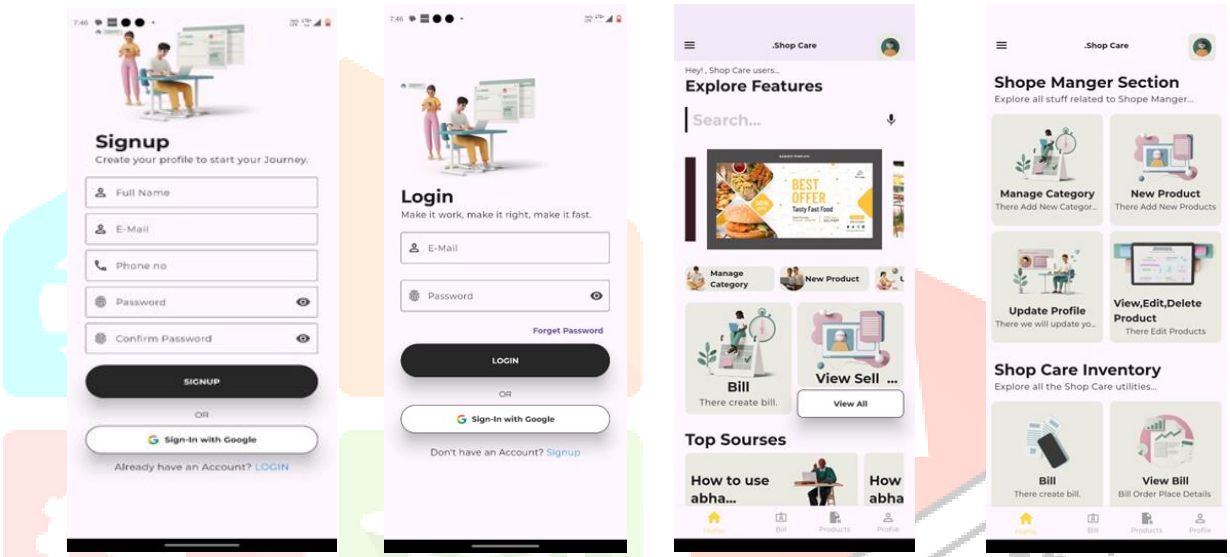

Fig 3: singup, login and dashboard page

These screens show the entry point of the application, where users can create an account or log in. After login, the dashboard provides access to core features like product listing, billing, and sales.

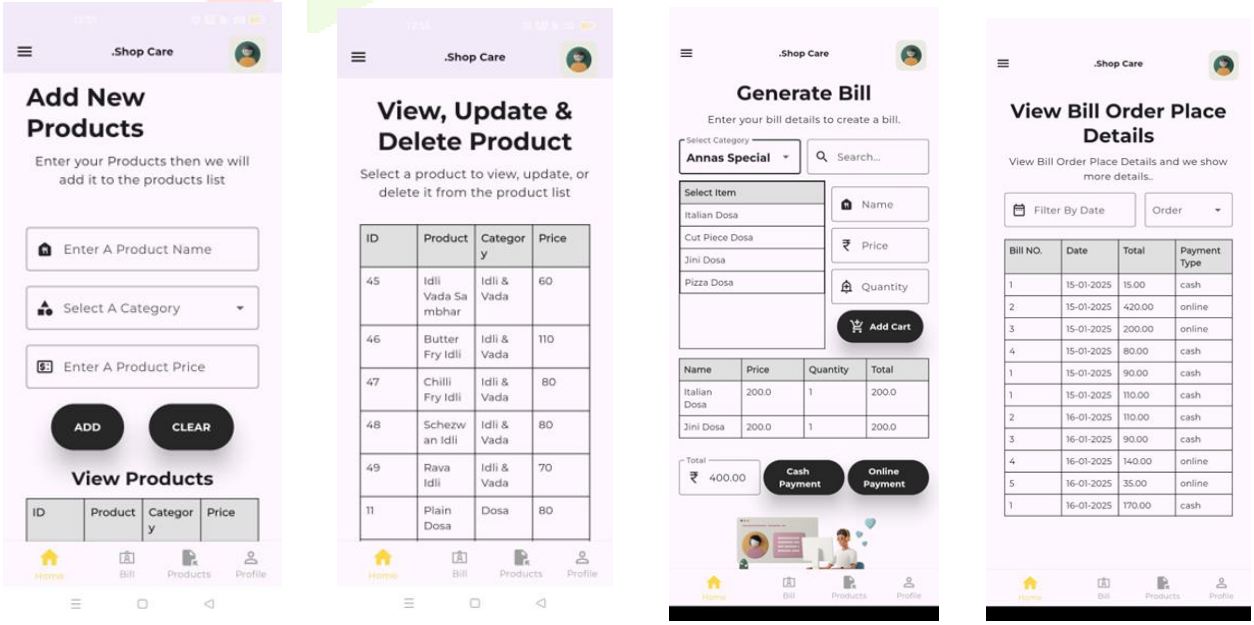

Fig 4: product management and billing page

This section displays how products can be added, updated, or removed from the inventory. The billing screen allows users to create bills for customers by selecting items and viewing totals instantly.

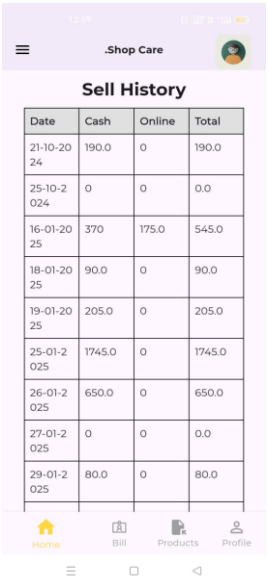

Fig 5: sales page

This screen presents a summary of completed transactions, including sales records and total amounts. It helps the shop owner track daily performance and maintain a record of all sales.

VIII. RESULT AND DISCUSSION

The application was tested in a simulated retail environment. It showed real-time updates in inventory, generated invoices correctly, and synced data across multiple devices instantly. The intuitive UI improved ease-of-use for non-technical users. Supabase significantly reduced backend complexity.

IX. FUTURE SCOPE

Smart Shop Tracker can evolve into a smart, scalable retail system by integrating technologies like AI, IoT, Blockchain, AR, and Cloud Computing. Future enhancements may include AI-based sales prediction, smart inventory tracking with IoT, secure transactions via blockchain, AR-powered virtual shopping, multi-store management, and support for modern payment methods.

- AI integration for predictive analytics (stock prediction, customer trends).
- Barcode scanning & POS integration using Flutter plugins.
- Multi-language and accessibility support for diverse regions.
- Blockchain-based product verification for fraud prevention.
- PWA (Progressive Web App) extensions for browser-based retail tools.

X. CONCLUSION

The Smart Shop Tracker system demonstrates the power of Flutter and Supabase in delivering a lightweight, modern retail management solution. The application simplifies tasks like inventory tracking and sales billing, providing small shops with powerful tools to modernize operations.

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