Campus Mart–Student Marketplace

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Abstract- *CampusMart is a campus-focused digital marketplace designed to simplify the buying, selling, and exchanging of goods within a university environment. Many students face challenges obtaining or disposing of essential items such as textbooks, lab equipment, and electronics. Existing online solutions are fragmented, lack security, and cater to a broader audience, making campus-specific transactions inefficient. CampusMart bridges this gap by providing a secure, authenticated platform exclusively for students, featuring a lost-and-found section, integrated chat system, and eco-friendly exchange options. This research paper explores the platform's design, architecture, and social impact in fostering sustainability and collaboration within academic communities.*

Keywords- *Campus Marketplace, Student Networking, E-Commerce, Secure Authentication, Sustainability, Peer Exchange, Web Application, Community Platform, Item Trading.*

I. INTRODUCTION

University campuses are dynamic micro-communities where students frequently buy and sell everyday items — from academic supplies to electronic gadgets. However, these transactions often occur informally through social media or word-of-mouth communication, leading to inefficiencies, privacy concerns, and mistrust. General platforms such as OLX or Facebook Marketplace are not optimized for student environments; they expose users to outsiders, involve unnecessary steps, and lack verification.

CampusMart aims to bridge this gap by introducing a secure and accessible marketplace designed *exclusively for campus use.* Each user is verified through their institutional email, ensuring credibility. The platform provides an intuitive interface where users can list items for sale or exchange, browse available products, and communicate safely through in-app messaging.

In addition to reducing waste and promoting affordability, CampusMart encourages sustainability through item reuse, creating an environmentally responsible campus culture.

II. LITERATURE SURVEY

Several researchers have explored the development of specialized online marketplaces and localized trading systems. The following studies provide the foundation for CampusMart's design principles:

RESEARCH PAPER:

A] Student Online Marketplace for University Community (Indonesian Journal of Electrical Engineering & Computer Science)

Authors: M. F. Ismail, M. A. Aziz, F. N. S. Mohd Nor, S. R. Syed Aris, S. Zambri

Published: July 2020

Main points from the abstract:

I. Campus-Focused Marketplace: The paper introduces a digital marketplace designed exclusively for university students to support small-scale trading and entrepreneurship within the academic community.

II. **Challenges with Existing Systems:** Highlights that

students rely on informal tools such as WhatsApp and Facebook, which lack verification and structured listings.

III. **Secure Student Authentication:** Access to the system is restricted to verified students using institutional credentials to ensure safety and trust.

IV. **Local Economic Growth:** Encourages student-to-student business and the reuse of goods, promoting self-sustainability inside campus.

V. **System Validation:** Prototype testing confirmed ease of use, safety, and potential to enhance student engagement and affordability.

B] Internet of Things and Its Applications to Smart Campus: A Systematic Literature Review (iJIM – International Journal of Interactive Mobile Technologies)

Authors: Nadire Cavus, Seipati E. Mrwebi, Imran Ibrahim, Temiloluwa M. Modupeola, Albert Y. Reeves

Published: December 2022

Main points from the abstract:

I. **Smart Campus Concept**: Reviews how Internet-of-Things (IoT) technologies improve efficiency and sustainability in university environments.

II. **Digital Integration:** Identifies that campus management and student services benefit most from secure and interconnected digital platforms.

III. **Technological Framework**: Summarizes hardware, software, and network components used in smart campus systems from 2017–2022.

IV. **Relevance to CampusMart:** Demonstrates the growing importance of adopting intelligent, student-centered solutions for better campus experiences.

V. **Future Challenges**: Notes integration complexity, interoperability issues, and cost as key limitations in expanding campus-based applications.

C] Design and Development of a Localized E-Commerce Solution for Students Focusing on Economical Sharing (arXiv Preprint)

Authors: Faiz Ahmed, Nitin Kumar Jha, Md Faizan

Published: November 2024

Main points from the abstract:

I. **Student-Centric Marketplace:** Proposes ShareSpace, a localized web platform enabling students to buy, sell, and share second-hand goods within the campus environment.

II. **Affordability and Reuse:** Emphasizes cost-effectiveness and environmental awareness by promoting circular usage of student resources.

III. **Modern Tech Stack**: Implements the prototype using Node.js, React, and MongoDB for a scalable and responsive interface.

IV. **Data Security and Verification:** Ensures account creation through institutional verification to maintain credibility.

V. **Relevance to CampusMart:** Closely aligns with the concept of CampusMart by addressing the same needs—verified access, item reuse, and sustainability—within educational ecosystems.

PROBLEM DEFINITION

In most university environments, students regularly need to buy, sell, or exchange everyday items such as textbooks, lab materials, gadgets, furniture, and even second-hand goods. However, there is no dedicated and reliable digital platform designed specifically for students within their academic institutions to conduct these exchanges efficiently and safely.

Existing e-commerce platforms like OLX, Quikr, and Facebook Marketplace are public and unregulated, allowing anyone to participate. This lack of restriction introduces several issues such as privacy risks, scams, spam listings, and the possibility of interacting with non-campus users. Similarly, social media or messaging groups, though popular among students, are highly unstructured and lack search or verification mechanisms, resulting in confusion, repeated listings, and limited discoverability.

Another major challenge is the absence of authentication systems that restrict access to verified

students or campus members. Without proper verification, users cannot ensure that they are communicating with genuine peers from their own institution. Additionally, there is no integrated solution that promotes resource reuse, affordability, and sustainability — aspects that are crucial for campus communities.

Currently, most on-campus transactions are done manually, either through notice boards, word of mouth, or informal communication. These traditional methods are time-consuming, inefficient, and offer no mechanism for tracking items or ensuring transparency between buyers and sellers.

Hence, there exists a clear need for a centralized, campus-exclusive marketplace that allows students to safely and efficiently buy, sell, and exchange goods within their academic institution. Such a system should provide:

1. **Secure Authentication:** Restrict access only to verified students through institutional credentials (college email IDs).

2. **Simple User Interface:** Ensure quick item listing, browsing, and communication through an intuitive design.

3. **Real-Time Communication:** Enable direct chat or message exchange between verified users to negotiate or confirm deals.

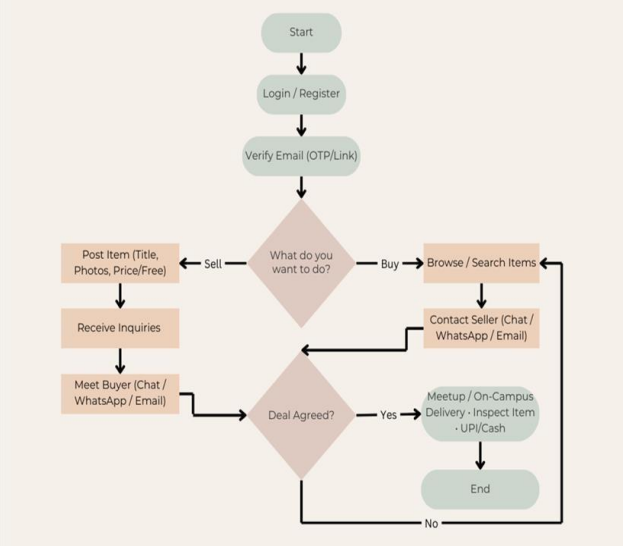
4. **Categorization and Search Functionality:** Allow users to easily filter and find relevant products by category or keyword.

5. **Administrative Control:** Include moderation features to maintain data integrity, remove inappropriate listings, and prevent misuse.

6. **Scalability and Maintainability:** Utilize modern web and cloud technologies to ensure low maintenance and high availability.

III. PROPOSED METHOD

PROPOSED SYSTEM ARCHITECTURE



A. System Overview

The proposed system, CampusMart, is a mobile-based marketplace application developed using React Native for the front-end and Supabase as the backend and database service.

The platform provides a secure and verified environment exclusively for students to buy, sell, and exchange used or new goods within their campus.

By integrating user authentication, real-time database synchronization, and cloud-based data management, CampusMart ensures fast, reliable, and secure operations.

The system's main objectives are:

1. To provide a campus-exclusive marketplace for verified students.

2. To create an efficient digital ecosystem promoting resource reuse and affordability.

3. To ensure data security and seamless scalability through modern cloud-based architecture.

CampusMart focuses on user convenience, platform trustworthiness, and sustainability, providing students with a smarter and safer way to manage their on-campus trading activities.

B. System Architecture

CampusMart follows a **client–server architecture** where the mobile client (React Native app) communicates with the **Supabase backend** through secure APIs.

1. Client Layer (Frontend – React Native):

- Built using React Native, ensuring cross-platform compatibility for both Android and iOS.
- Provides the user interface for account registration, item posting, browsing listings, and in-app messaging.
- Implements responsive design principles for smooth user experience across various screen sizes.
- Integrates Supabase SDK for real-time updates and authentication handling directly within the app.

2. Application Layer (Backend – Supabase):

- Supabase provides serverless backend functionality with PostgreSQL as the underlying database.
- Implements RESTful APIs and real-time subscriptions for instant data updates (e.g., when new items are posted or sold).
- Handles authentication through Supabase Auth, allowing login/signup with institutional email verification.
- Provides secure row-level security policies to ensure users can only access their own data.

3. Database Layer:

- Structured schema designed in PostgreSQL hosted on Supabase.

Tables include:

- users – stores verified student profiles.
- items – maintains listing information (title, price, category, image URL, seller ID).
- chats – stores conversation history between users.
- reports – records flagged posts or complaints for admin review.
- Implements foreign key relationships for efficient queries and consistency.

C. Major System Modules

1. User Authentication Module:

- Students register and log in using their institutional email IDs.
- Supabase Auth manages sign-up, email verification, and session persistence.
- Only verified users can post or contact other members, ensuring a safe community.

2. Item Management Module:

- Users can add, update, or remove listings (items for sale or exchange).
- Each listing includes details such as title, description, price, images, and category.
- Real-time updates allow buyers to view newly posted items instantly without refreshing.

3. Search and Filter Module:

- Provides keyword-based and category-based searching to improve item discoverability.
- Allows sorting by price, date, and proximity within the campus.

4. Chat and Communication Module:

- Built using **Supabase's real-time database channels** for instant messaging.

- Enable buyers and sellers to communicate securely within the app without sharing personal contact details.

5. Admin and Moderation Module:

- Admin dashboard accessible to campus administrators.
- Admins can monitor activities, remove inappropriate posts, or suspend suspicious users.

D. Implementation Details

- Frontend: Developed in React Native, offering cross-platform support and efficient rendering using the Expo framework.
- Backend: Built using Supabase, providing backend-as-a-service functionality with integrated authentication, real-time database, and storage of APIs.
- Database: Utilizes PostgreSQL (via Supabase) for structured and relational data management.
- Storage: Images and files are stored securely in Supabase Storage using bucket-level access policies.
- Hosting & Deployment: The application is deployed through Expo Go for testing and can be packaged as a standalone Android or iOS app.

E. Security and Data Protection

- Supabase employs JWT-based authentication and row-level security (RLS) to restrict unauthorized access.
- All communication between client and server is encrypted via HTTPS.
- Role-based permissions ensure only verified users can post or message others.
- Admins can monitor and act on flagged listings to maintain a safe environment.

F. Advantages of the Proposed System

- Campus Exclusivity: Access limited to verified institutional email addresses.
- Cross-Platform Compatibility: Built with React Native for Android and iOS.
- Real-Time Updates: Supabase's real-time database ensures instant sync of listings and chats.
- Secure Authentication: Email verification prevents external users from accessing the platform.
- Sustainability: Encourages reusing items, reducing waste, and promoting cost-effective transactions.
- Scalable and Cost-Efficient: Serverless backend (Supabase) requires minimal maintenance while offering high scalability.

DESIGN AND IMPLEMENTATION

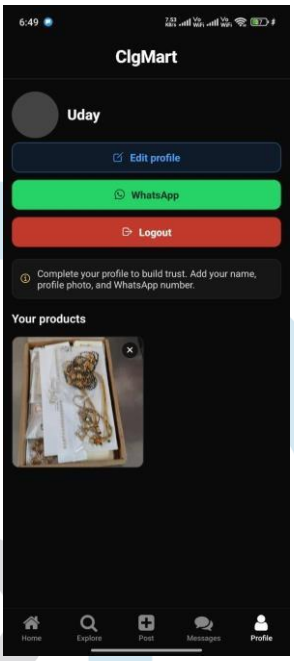
The CampusMart system was designed and developed as a secure and user-friendly mobile application using React Native for the frontend and Supabase for the backend and database services. The platform follows a client–server architecture in which the React Native app serves as the client interface, while Supabase manages authentication, data storage, and real-time updates on the server side. This design ensures fast performance, scalability, and seamless synchronization between users.

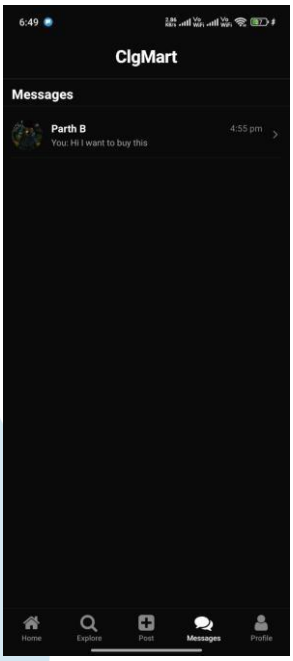
The application frontend, built in React Native, provides a smooth and responsive user experience across both Android and iOS devices. It includes essential screens such as Login and Signup, Home, Add Item, Chat, and Profile. Students can register using their institutional email IDs, post listings with item details and images, and communicate with potential buyers or sellers through an integrated real-time chat system. Supabase's Realtime API ensures that new posts and messages appear instantly without requiring manual refresh.

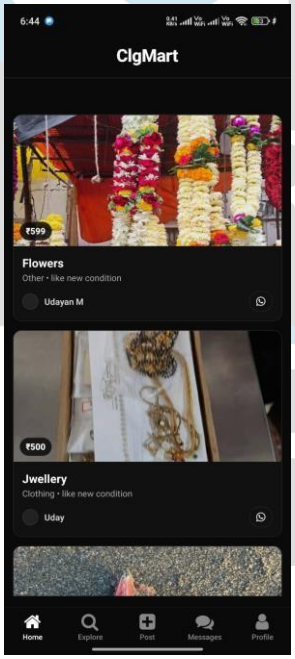
On the backend, Supabase handles user authentication through Supabase Auth, storing all user and item data securely in a PostgreSQL database. The platform also manages file uploads through Supabase Storage, providing signed URLs for secure access. Data integrity and privacy are maintained through row-level security policies and JWT-based authentication.

The system was thoroughly tested to ensure reliability and ease of use. Functional testing verified all major features, including authentication, item posting, and real-time chat, while performance testing confirmed consistent response times under multiple users. The combination of React Native's cross-platform capabilities and Supabase's real-time data handling resulted in a highly efficient and low-maintenance mobile marketplace tailored for campus environments.

Overall, the implementation of CampusMart demonstrates how cloud-based tools and cross-platform frameworks can be effectively integrated to build a secure, scalable, and sustainable solution for students to buy, sell, and exchange goods within their campus.







IV.CONCLUSION

The development of CampusMart successfully addresses the lack of a dedicated and secure digital marketplace for students within university campuses. By integrating React Native for a cross-platform mobile interface and Supabase for backend and database management, the system provides a fast, reliable, and scalable solution that enhances student convenience and promotes sustainability. Through verified authentication, real-time communication, and user-friendly design, CampusMart creates a trusted environment for students to buy, sell, and exchange goods safely within their institution. The platform not only reduces waste through resource reuse but also encourages a collaborative and self-sufficient campus community.

Future enhancements such as payment integration, AI-based product recommendations, and a Lost and Found module will further expand the application's scope and usability. Overall, CampusMart demonstrates how modern cloud technologies and mobile development frameworks can be leveraged to build efficient, eco-conscious, and student-centered digital ecosystems for academic institutions.

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