

Designing a Campus Marketplace for University Students

ZAID AGUILAR¹, SITARA ELIAS-PEREZ², AND RAHMA SEID.³

¹Middle Tennessee State University, Murfreesboro, TN 37132 USA

ABSTRACT Rising costs across digital and local markets have made it increasingly difficult for students to access affordable essentials. This project presents an e-commerce mobile application designed to help university students buy and sell easily within a secure campus-only environment. The application will support account creation, product listings, favorites tracking, and secure interactions by requiring student email authentication. The system will implement a modern tech stack: Kotlin using Android Studio for the mobile application, while Supabase provides authentication and data services backed by PostgreSQL for the relational database. The tools provide a reliable foundation for managing listings, handling user sessions, and supporting marketplace operations.

INDEX TERMS Android development, Kotlin, marketplace, mobile application, PostgreSQL, student network, Supabase.

I. INTRODUCTION

THE increasing prices of products on numerous platforms have created significant challenges for young adults, specifically students, in the modern era. Due to this, it's often difficult for the common person to afford essentials.

A few months ago, the local campus bookstore, Textbook Brokers, closed down for good. The closure was largely due to the increasing popularity of online textbooks and retailers, which made it easier for students to find affordable options. As a result, students now face the challenge of sourcing their textbooks from an alternative bookstore that typically charges at much higher prices. Instead of spending a budget of \$30-\$70, students now find themselves paying hundreds more for the same specific books required by their professors. Not only does the loss of Textbook Brokers affect the financial situation of students, but it also showcases the larger struggle physical stores face in the digital age, emphasizing the need for an innovative solution that supports our fellow students.

Our team proposes the idea of a campus marketplace. The purpose of the app is affordability, made for students and by students.

II. RELATED WORKS

One such example is a study by Ahmed et al. [1], which developed ShareSpace, a localized e-commerce solution for college students. The authors state that "existing platforms often fail to address the specific needs of campus communities, where students face challenges such as financial

constraints, lack of access to affordable goods, and inefficient resource circulation" [1]. These findings highlight the importance of developing systems that promote affordability and sustainability within student populations.

A. E-BAY

E-Bay serves as a widely recognized platform but operates on a general marketplace model, lacking particular features tailored for college students. While it offers a vast range of products, the need for localized filtering and community trust tools are missing, making it less suitable for student transactions. Moreover, the complexity of navigating a more expansive marketplace that can lead to user frustration among students seeking quick and relevant findings.

B. CRAIGSLIST

Similarly, Craigslist offers a broad marketplace experience. However, it is often scrutinized for its lack of user verification and safety features. Students may face obstacles when attempting to identify trustworthy sellers or listings, which can hinder the overall user experience. Our proposed solution aims to address these shortcomings by implementing measures such as requiring student email verification for account verification.

C. AMAZON

Amazon is one of the leading platforms in online e-commerce and even offers students a 6-month trial to Amazon Prime,

with perks such as Amazon Music, Prime Video, and free shipping. Even so, Amazon's design and pricing model don't specifically target college campus populations.

Given that the platform serves a vast broad market, many items are priced according to general consumer demand, often higher than what students find affordable. Additionally, some benefits under Amazon Prime have restrictions based on location, availability for same-day delivery, and eligibility for certain deals. Therefore, the pricing and feature set may not fully meet campus communities' constraints and practical needs.

III. PROPOSED APPROACH

This application will be designed to run on Android devices, providing a seamless experience for users to manage listings within the marketplace. The front-end development will take place using Android Studio, ensuring a robust and user-friendly interface. The back-end will leverage Supabase's PostgreSQL database and authentication system to efficiently manage both user accounts and product listings.

The application will offer several essential features to enhance user interaction and functionality:

A. USER AUTHENTICATION & ACCOUNT MANAGEMENT

Users will be able to create accounts using their student email addresses, which will require verification to ensure a secure and trusted environment. This feature aims to foster a community of authenticated users, minimizing fraudulent activities.

B. LISTING MANAGEMENT

Once registered, users will have the ability to create, edit, and delete their listings. Each listing will contain important details, such as the product name, description, price, images, and condition. This functionality enables users to showcase products and manage their postings effectively.

C. FAVORITES FUNCTIONALITY

Users will be able to save specific listings to their favorites, allowing them to return to those items for future consideration or purchase easily. This feature enhances the user experience by providing convenient access to favored products.

D. BUILT-IN MESSAGING SYSTEMS

To facilitate communication, the mobile application will include a messaging system that allows users to interact directly with sellers. This feature aims to streamline inquiries and foster negotiations regarding the listings.

E. USER BLOCKING & REPORTING

To maintain a safe marketplace environment, users will be able to block and report other users who violate the terms of service. This feature ensures that the platform remains respectful and secure for all users.

IV. TECHNICAL IMPLEMENTATIONS

The chosen technologies, frameworks, and database design are essential for supporting the core functionalities in the applications:

A. FRONT END

The front end of the application will be developed using Android Studio, enabling a robust and user-friendly interface optimized for Android devices. The design will focus on establishing an intuitive experience for users, allowing easy navigation through various features such as account registration, listing creation, and interaction with sellers. The user interface will display key functionalities, including creating, editing, and deleting listings, as well as managing a saved list of favorites.

B. BACK END

The back end will be powered by Supabase, leveraging its PostgreSQL database to effectively manage listings and user sign-up and sign-in authentication. The server-side logic will handle user account set-up, including the verification of student email addresses, ensuring a secure and streamlined registration process. In addition, the system will support CRUD operations (Create, Read, Update, Delete) for listings, allowing users to manage their posts seamlessly. The messaging system to promote communication between student buyers and sellers will also be integrated into the back end, enhancing user interaction.

C. DATABASE DESIGN

For database interactions, PostgreSQL will be utilized to communicate with the Supabase database. This approach enables a more straightforward manipulation of database objects within the application's code. The database schema will include tables for users, listings, and messages, ensuring that all necessary details, such as product name, description, price, images, and condition, are well-structured. Additionally, user privacy will be prioritized by implementing features that allow users to block and report others for any violations of the terms of service.

V. RESULTS

The app prototype was tested using an Android emulator to evaluate usability, responsiveness, and navigation flow. The priority of testing was to determine how well the interface performs during typical user actions, such as authentication, list creation, and profile viewing.

A. USER INTERFACE

The application begins with a landing page that displays the app logo, project title, all team member names, and a "Start" button. By clicking this button, users are taken to the account options screen, where they can choose to either register or log in. The navigation between the screen pages was incredibly smooth and the backgrounds remained the same with no issue.

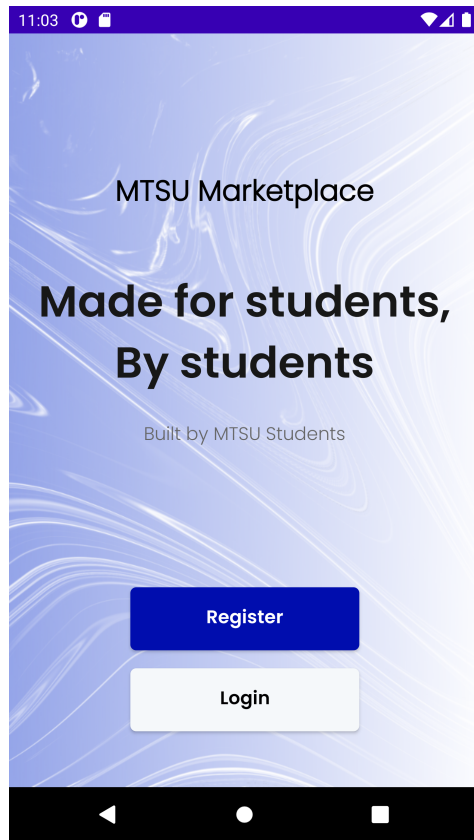


FIGURE 1. Image of account options page where the user is led to either register or log in.

When testing the login, the email and password fields functioned as expected, successfully redirecting users to the home interface after valid student credentials were entered. Invalid inputs, such as any email without the standard university email format, triggered immediate on-screen error messages, confirming that the client-side input handling is working correctly.

Meanwhile, the registration interface prompted users to enter their first name, last name, university email address, and password. All fields were validated, and the password field is obscured for user security. After submitting valid information, the emulator will display confirmation feedback on the bottom of the screen and redirect the user to the home environment.

B. MARKETPLACE FEATURES

The Listings page showcases all active marketplace products in a scrollable card layout. Each card includes the item name, description, price, and lastly, an image, if available. Testing proved that the viewport settled correctly, remained responsive while scrolling, and updated dynamically after new items were added. In addition, the interface functioned reliably, even when numerous listings were present.

Users can create new marketplace entries clicking the Add Listing button and filling out the form. It allows users to input

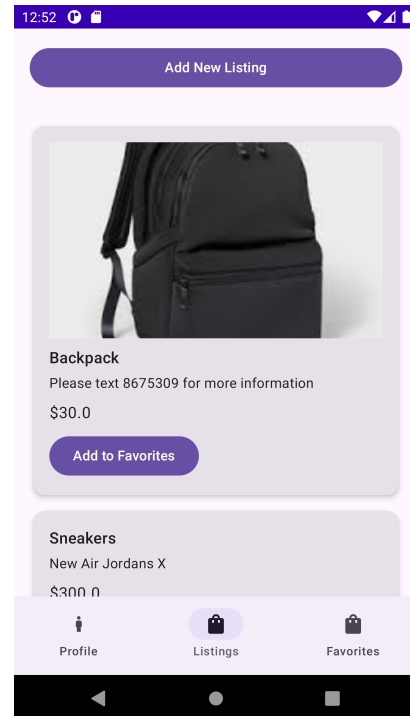


FIGURE 2. Image of the Listings page, where user can explore through options of products provided by other students. Example account used for demonstration only.

the item name, description, and price, along with including an image as an optional feature. After submitting a valid listing, the emulator immediately displayed the new item in the listings feed, confirming that data insertion and UI refreshing were executed correctly in a single session.

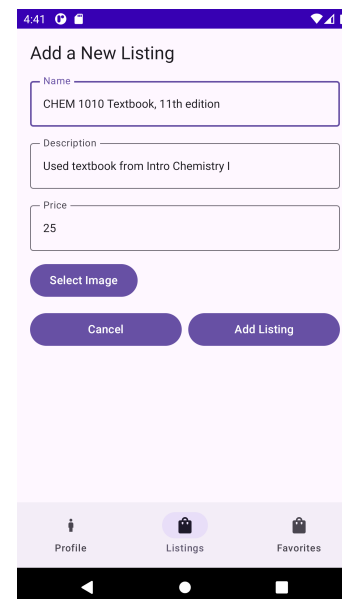


FIGURE 3. Image of the Add Listings feature being used to add a Chemistry textbook at an affordable rate.

The Favorites tab displays items that users have marked for

later viewing. During testing, selecting "Add to Favorites" successfully added the chosen item to the Favorites page. The app retained the list during navigation, ensuring that no information was lost when switching between tabs.

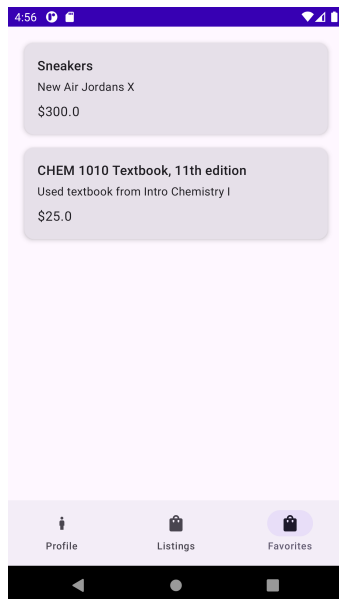


FIGURE 4. Image of the Favorites page, compiled of all the products that the user has liked and saved for later.

The Profile page displayed authenticated user's email and included a functional "Sign Out" button. It was confirmed that signing out cleared the authentication state and returned the user to the landing page, after multiple login and logout cycles were conducted without errors, demonstrating consistent session managements.

VI. DISCUSSION

The development of the MTSU Marketplace application offered practical insight into building a mobile software system that integrates authentication, data management, and a user-friendly interface. While the Results section illustrates how each feature functioned in the emulator, this section reflects on the broader effectiveness of the system, overlooking key design choices, challenges faced during development, and areas for improvement in future iterations.

A. CHALLENGES

- **Establishing a Maintainable Code Structure:** To avoid various merge conflicts, we initially split UI screens into separate composable files. Later on, fragments were introduced and it was decided to keep the same modular structure to reduce cross-file dependencies.
- **User Authentication Setup:** Integrating Supabase authentication required thorough handling of the registration and login processes. Issues such as email domain validation and error handling occurred early on, requiring numerous efforts to resolve.

- **Data Synchronization:** Assuring that new listings appeared immediately, and keeping favorites intact, along with reliable clearing sessions at sign-out, stressed the challenge of maintaining the UI state to align with Supabase's backend.

B. SUMMARY OF FINDINGS

The prototype application exhibited that students could register, authenticate, browse listings, add new items, and save favorites with consistent performance in the emulator. The navigation structure, located at the bottom of the page, facilitated a predictable flow between **Profile**, **Listings**, and **Favorites**. Supabase effectively supported lightweight CRUD operations and authentication, establishing that a minimal back end can support core marketplace features during early development.

C. LIMITATIONS & FUTURE WORK

The current represents an early model with several limitations:

- The profile page lacks user data beyond email display and sign-out button
- The user authentication could use more improvements to confirm student registrations, aside from the institution email format, such as student id, known as M#'s or partner with the local institution's ITD team to help outsource the application.
- The app does not include messaging between buyers and sellers
- The project has not yet reached the point where it can be deployed to the app store and supported on physical devices.

Future work could present in-app messaging, detailed user profiles, advanced search and filtering tools, and a reporting/blocking functionality, in addition to a more scalable back end design. Once stable, the system could be tested with real users to collect feedback on usability and performance.

VII. CONCLUSION

The MTSU Marketplace application showcases the feasibility of building a campus-focused mobile marketplace for students. By utilizing Android Studio for front-end development with Supabase for authentication and database services, the prototype provides crucial marketplace functions, including account creation, item listings, and favorites management. The design prioritizes simplicity, accessibility, and affordability, reflecting the needs of the student community it serves.

Currently the system offers only basic features, but its architecture supports meaningful expansion. With further development, such as messaging, detailed profile management, more enhanced product listings, and improved security features, the application has the potential to grow into a fully functional marketplace tailored precisely for students at Middle Tennessee State University.

REFERENCES

- [1] F. Ahmed, N. Kumar Jha, and M. Faizan, textit“Design and Development of a Localized E-Commerce Solution for Students focusing on Economical Sharing,” in *ResearchGate*, Nov. 2024 [Online], doi: <https://doi.org/10.48550/arXiv.2411.11527>.

...