College Marketplace: Providing a Secure Digital Marketplace for College Students to Participate in E-Commerce Activity

A Technical Report submitted to the Department of Computer Science

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Ayub Shahab

Spring, 2023

Technical Project Team Members

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Briana Morrison, Department of Computer Science

ABSTRACT

The lack of a safe and reliable digital marketplace tailored exclusively to college students has been a persistent issue. As a result, maneuvering through the convoluted web of scams and potentially hazardous interactions on popular platforms such as OfferUp and Facebook Marketplace has proved to be a burdensome and perilous task. Against this backdrop, specifically avoiding scams and interacting with other students in a safe environment, led to the birth of College Marketplace, which streamlines the process of posting listings online in a secure environment. To ensure security, Google Authentication is leveraged to limit access and e-commerce activity to college students. The platform is designed with Figma and built using Laravel (a PHP web-based framework with great support worldwide), MySQL (relational database), and AWS for efficient hosting and centralized storage, allowing for minimal obstacles in achieving the MVP stage. The MVP will soon be released for student testing, and future enhancements will incorporate user feedback, including payment processing via Stripe.

1. INTRODUCTION

According to the NCES (National Center for Education Statistics), roughly 19.4 million students are currently enrolled in colleges/universities and this number is only expected to grow in the future. One thing that all students pursuing postsecondary education have in common is their need to interact in an ecommerce marketplace to obtain items they need or want. Whether purchasing furniture to move into their dorm for the first time, or buying used textbooks and other classroom equipment, all students interact with online marketplaces in some way.

Since college students have limited financial means, the most popular designated places for them to browse are Facebook Marketplace and Offer Up. However, that is where some of the issues with such marketplaces becomes prevalent: scams, lack of security, and lack of privacy. Thus, it becomes a necessity for a better online marketplace to be designed; one that is specifically for students. The College Marketplace project aims to address these issues by offering a secure ecommerce platform for students to interact with their peers at the university.

2. BACKGROUND

UVA students are already aware of the challenges with using marketplaces such as Facebook and Offer Up. The presence of a multitude of third-party actors, who harbor malicious intentions and possess the ability to maneuver their way around these platforms, present a significant threat to the student community. Consequently, a potential solution that students idealized that has its own drawback was the use of GroupMe group chats. However, with the inclusion of almost 3000 students interacting within the same chat, students quickly realized this is not the most ideal way of interacting in e-commerce activity.

3. RELATED WORKS

Grayless (2022) explores the various kinds of scams that students are potentially exposed to when they navigate a platform like Offer Up. Careful examination of her research findings served as a fundamental building block, offering significant insights into the scale and scope of this problem. Grayless emphasizes that some of the most common scams that occur involve fake cash or checks, as well as the use of fake websites to obtain credit card information, an act referred to as phishing. Bouncing checks after the seller has shipped the item to the buyer is another common form of scam.

Another common breeding ground for scams to occur is Facebook Marketplace, as DiNardi (2022) notes. He explains that scammers are more likely to target individuals and students on Facebook Marketplace because they can hack existing user profiles and build credibility due to their social media presence. Additionally, scammers can force buyers into chat rooms, where they "pressure individuals into falling for their frauds." DiNardi emphasizes that Facebook in general is not a safe platform because of its widespread popularity and numerous data breaches and scams. In a single data breach in 2019, data for over 533 million users, across 103 countries was exposed.

The comprised security and likelihood of scams on existing platforms led to the birth of College Marketplace, which aims to address the shortcomings and challenges of existing ecommerce platforms.

4. PROCESS DESIGN

The process design of this project consisted of four major elements:

1) Client Needs & System Requirements
2) Front End Design & Implementation
3) Backend Design
4) Challenges & Solutions

All these elements contributed to the project's process design.

4.1 Client Needs & System Requirements
The seven primary requirements for College Marketplace are discussed below.

Requirement 1: Giving Users an Identity -
A student's full name and university associated email should be visible to fellow students to establish identity and credibility.

Requirement 2: Google O-Auth and Email Verification - UVA students would need their university emails to sign-up and a verification email should be sent to the university email to authenticate users.

Requirement 3: Distinguishable Posts - Students should be able to make distinguishable posts regarding selling items versus renting items versus subleasing their places of residence. Students should be able to post items for sale and categorize them based on predefined categories. Rental or lease posts must specify availability periods.

Requirement 4: Location Feature - All posts should include a location indicating where that item can be acquired.

Requirement 5: Search Capability - The system must have search capabilities for users to quickly find items of interest, with pattern matching for entered terms and associated listing words.

Requirement 6: In-App Chat and Email Notifications - The application should allow chatting with the item owner to address any post-related questions.

Requirement 7: Responsiveness - The web application must be flexible to accommodate all screen sizes, from mobile to desktop.

4.2 Front End Design and Implementation
I performed the overall design and planning of the web application on Figma, which is an online platform to brainstorming ideas, designing prototypes, or building solutions. I drew considerable inspiration from existing ecommerce platforms such as Etsy and Amazon, in terms of the overall layout and structure of the web application. After conducting a user survey, I selected a color palette that appealed most to the student audience. Finally, I converted the

approved Figma design into functional webpages using simple HTML and CSS. This resulted in fully customizable pages that could adapt to different screen sizes through the application of media queries. Furthermore, I leveraged JavaScript to enhance the user experience by embedding additional features at various stages.

4.3 Back End Design

I constructed the backend primarily through PHP as it is a server-side language that allows web developers to create dynamic content and interact with databases. In the case of College Marketplace, server-side development is crucial as it allows for webpages to be constructed dynamically based on the information the user is seeing. The information displayed to a user varies depending on the webpage they are browsing, with server-side calculations determining what information to show. Laravel, a PHP full stack framework, connects the backend to the front end, enabling flexibility and customization. The ecommerce platform stores its main data in a MySQL relational database, which is stored on AWS as well as the application itself.

4.4 Challenges and Solutions

The main challenges during development can be simplified into two categories: responsiveness, and updating information. In regards to responsiveness, the webpages and their respective layouts needed to accommodate various screen sizes, including mobile, tablet and desktop. Media queries were deployed to dynamically and efficiently restructure the information presented to the user. Updating information displayed on the screen, based on the user's actions, was a particular challenge as the content for the respective webpages is decided client side. The flow of the webpages requires the data to be finalized on server side before client-side

rendering formats the data in a presentable format. To resolve this issue, I incorporated component-based layouts into the webpages to allow the website to retrieve additional information from the server without requiring repeated page reloads, thus maintaining dynamicity.

5. RESULTS

With a focus on meeting system requirements and client needs, I created a visually appealing platform for students that addresses their needs and allows them to engage in ecommerce activity with fellow students, while ensuring privacy and security. The platform is designed to be flexible and adaptable to different screen sizes, as well as dynamic in terms of its content and layout. The strategic partitioning of databases facilitates rapid and efficient data retrieval, ultimately enabling users to gain access to authentication procedures and post listings from any geographical location. The platform successfully captures the interest of the college student demographic by deploying modern web trends to create visually appealing layouts.

The platform has been designed to streamline the process of posting items, allowing users to create a new listing in as little as 30 seconds by including only the most pertinent information. This reduces the time and effort required to create listings, which allows sellers to post more frequently and buyers to have access to a wider range of items with ease. The platform's search functionality has also been optimized by adding regex mapping to enable users to quickly and accurately locate the items they are interested in. To further enhance the user experience, the platform includes an in-app chat feature that facilitates communication between buyers and sellers. Furthermore, frequent email communication promotes prompt and responsive interactions by minimizing downtime between messages.

4

As the platform's MVP has been achieved, more students are expected to use it to fulfill their daily needs.

6. CONCLUSION

This project aimed to create a secure ecommerce platform exclusively for college students. The developed online marketplace is successful in this endeavor as the innovative platform provides a range of benefits for students, who serve both as sellers and buyers. The shortcomings and challenges of existing e-commerce platforms have been addressed through features such as Google authentication for institution verification. Furthermore, features such as item location, search capability, in-app chat, and email notifications allow for and spontaneous browsing and communication while harboring a safe environment for students to buy, sell, and rent items within their university community. The platform's close coordination with the student body for features, design decisions, and color selection, along with following modern web trends ensures that the platform is well received by the target audience. As a result of unique features and a tailored approach that emphasizes privacy and security, College Marketplace has the potential to become the primary online marketplace for college students.

7. FUTURE WORK

The developed MVP of the platform is ready for release to the student body; however, close monitoring is necessary to address any potential developmental bugs. A plan for regression and performance testing has also been developed to ensure a quality student experience. Additionally, potential improvements to UI/UX and performance have been identified and will be implemented sequentially and carefully.

REFERENCES

DiNardi, G. (2023, January 5). Did you get scammed on Facebook marketplace? Retrieved September 23, 2022, from aura.com website: https://www.aura.com/learn/scammed-on-facebook-marketplace#:~:text=Many%20Facebook%20Marketplace%20users%20are,most%20common%20Facebook%20Marketplace%20scams.

Grayless, R. (2022, November 17). 7 Common Offer Up Scams. Retrieved September 23, 2022, from lowincomerelief.com website: https://lowincomerelief.com/common-offerup-scams/#:~:text=Some%20common%20OfferUp%20scams%20include,verification%20scams%2C%20and%20fake%20fees.