BSU Marketplace Project Report

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Abstract :

As the digital landscape continues to expand, there is an increasing demand for secure online marketplaces—especially within smaller institutions like colleges and universities—where students can safely conduct peer-to-peer transactions. The BSU Marketplace addresses this need by applying robust data protection, authentication, and authorization protocols. This localized platform leverages principles of cybersecurity and software engineering to meet a specific campus requirement. In developing the application, the authors explore the integration of both functional and non-functional requirements to deliver a fully operational and secure system.

Index Terms: Digital marketplace, peer-to-peer, cybersecurity.

1 Introduction

The BSU Marketplace is an innovative solution designed to address a critical gap within the Bowie State University (BSU) community. Currently, BSU students do not have a dedicated platform to promote or sell their items. If they do engage in sales, it is often through third-party platforms, which can create barriers to communication, security, and accessibility. The BSU Marketplace will serve as a standalone application that fosters student interaction and enhances campus connectivity, strengthening the university community.

2 Problem Statement

Despite being a thriving academic institution, BSU lacks an integrated digital marketplace exclusively for students. This absence limits opportunities for students to efficiently buy, sell, and exchange goods within the campus. By creating a university-specific platform, students will be able to interact within a trusted environment, ensuring safety, convenience, and community-building.

3 Methodology

3.1 Functional Requirements

To ensure a seamless user experience, the BSU Marketplace must incorporate the following core functionalities:

- Homepage: Within the application the homepage has buttons directing to other pages (register, login, etc.).
- BSU Email Verification: Users must sign up using their BSU-issued email accounts. This ensures that only enrolled students can access the platform, preventing unauthorized individuals from joining.
- Login Page: A secure login system that enables students to sign in with their credentials to access the application.
- Account Creation: Users will generate unique usernames and passwords that are linked to their BSU accounts. This provides a personalized experience while maintaining security.
- Selling Page: A dedicated marketplace page where students can upload and list items for sale. This page will facilitate the buying and selling process, ensuring ease of use and accessibility for the BSU community.
- Shopping Cart: Shopping Cart for item selection and checkout. Users can remove and add items to the Shopping Cart before checking out.

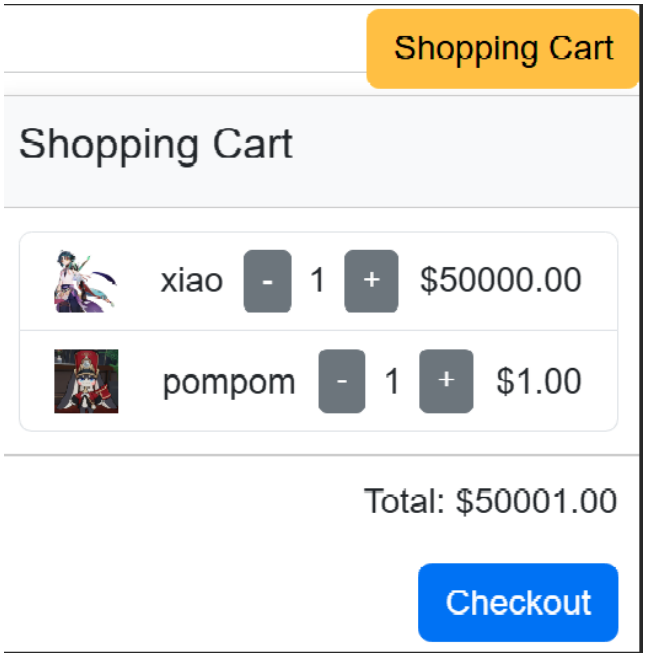

Figure 1. Shopping Cart

- Checkout Page: Users can checkout once they have finalized their shopping cart.

These functionalities are essential to creating a user-friendly and efficient marketplace, enabling students to manage their accounts and transactions effortlessly.

3.2 Non-functional Requirements

Beyond core functionalities, the application must adhere to several critical non-functional requirements to maintain security, reliability, and usability.

3.2.1 Security Requirements

- Data Protection: Personal information, including payment details, must be encrypted both in transit and at rest, en-

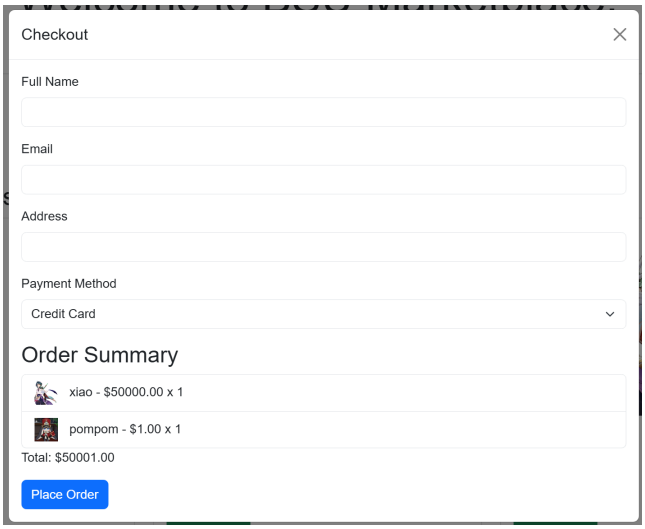

Figure 2. Checkout page

suring confidentiality and compliance with data protection standards.

- Authentication: Multi-factor authentication (MFA) should be implemented for a secure login process, particularly for transactions involving payments.
- Authorization: Role-based access control should be enforced to restrict user actions based on permissions. Only authenticated users who have completed necessary verification steps can sell items.

3.2.2 Reliability Requirements

- Data Consistency: The platform should ensure that user data and transaction records remain consistent and recoverable in case of system failures. Regular data backups will help maintain integrity.
- Error Handling: The system must provide meaningful error messages and recovery options to ensure a smooth user experience. Users should be able to retry failed actions or navigate back to previous states if errors occur.
- Authorization: Role-based access control should be enforced to restrict user actions based on permissions. Only authenticated users who have completed necessary verification steps can sell items.

4 Design Considerations

The BSU Marketplace should be built with a user-friendly interface and robust backend architecture to ensure reliability and efficiency. Key design aspects include:

- Scalability: The system should be capable of handling increasing numbers of users as the BSU community grows.
- User Interface (UI): A simple, intuitive interface that allows easy navigation for posting and searching for items.
- Mobile Compatibility: The platform should be optimized for both desktop and mobile users, ensuring accessibility across devices.
- Payment Integration: While primarily a peer-to-peer exchange platform, the system should support secure payment

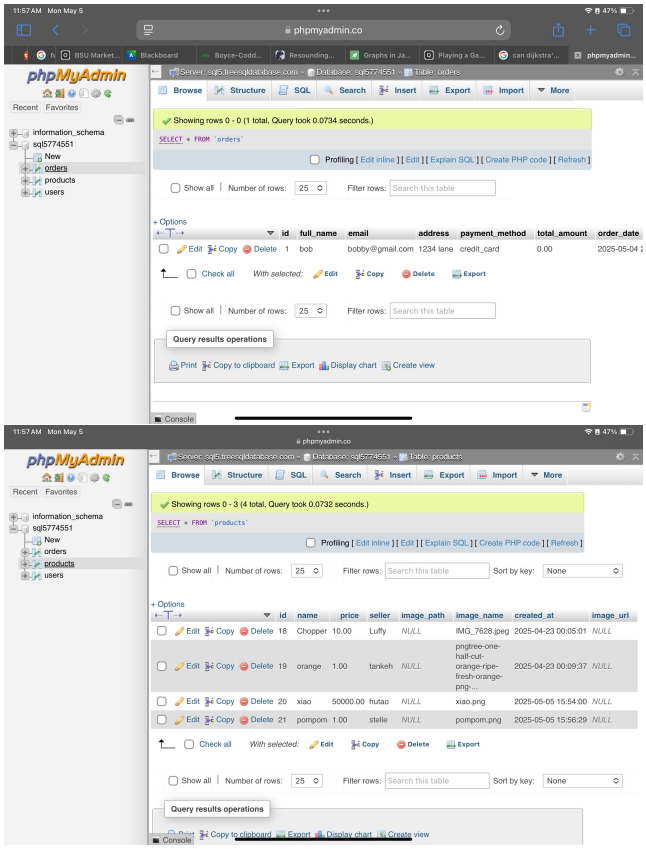

Figure 3. Database maintains transactions and consistently stores item uploads

gateways if financial transactions are implemented.

Function/Event	Purpose	Main Resources
addToCart	Add new product or increment cart	cart, DOM
updateCartDisplay	Render cart in popup	cartItems, cartTotal
incrementQuantity	Increase item quantity	cart
decrementQuantity	Decrease item quantity	cart
DOMContentLoaded	Fetch and display all products	/products/all, productsContainer
postProductForm.submit	Post a new product	/products/post-product, productsContainer
Click add-to-cart	Add product to cart	cart
Click increment/decrement	Change quantity	cart
Click shoppingCartButton	Show/hide cart	shoppingCartPopup
window.click	Close cart popup if clicked outside	shoppingCartPopup
Click checkoutButton	Save cart in localStorage	localStorage
checkoutForm.submit	Submit order	/checkout, localStorage, cart
updateCheckoutCartDisplay	Render cart inside checkout modal	checkoutCartItems, checkoutCartTotal
checkoutModal.show	Update checkout modal view	updateCheckoutCartDisplay()

Figure 4. Illustration of functions used in designing the application

5 Discussion

Throughout the development of this application, we experienced a range of technical and usability challenges with functionality and user experience. One of the initial and more critical task was establishing a reliable connection to a database. This was essential for storing and retrieving user data, item listings, and other dynamic content. Selecting the appropriate database structure and connection method ensured data persistence and integrity throughout the application.

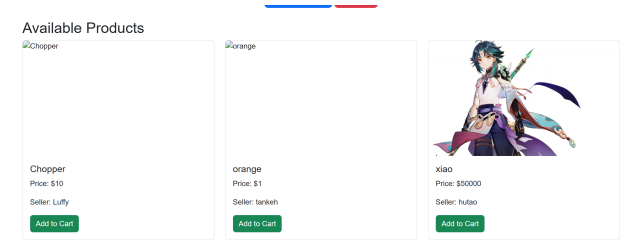

Figure 5. Item listings

Equally important was the process of identifying a suitable online web host. The hosting environment needed to support necessary backend technologies, enable smooth deployment, and provide scalability for growing user traffic. Most importantly, compatibility with database services and file storage were key considerations in this decision-making process. A significant issue encountered involved handling image uploads. Ensuring that user-uploaded images were displayed correctly without becoming broken links required careful attention to both file pathing and server-side storage configuration. This challenge was closely tied to pathing issues in general, ensuring uploaded files were saved to correct locations and could be reliably accessed later by the application and end users.

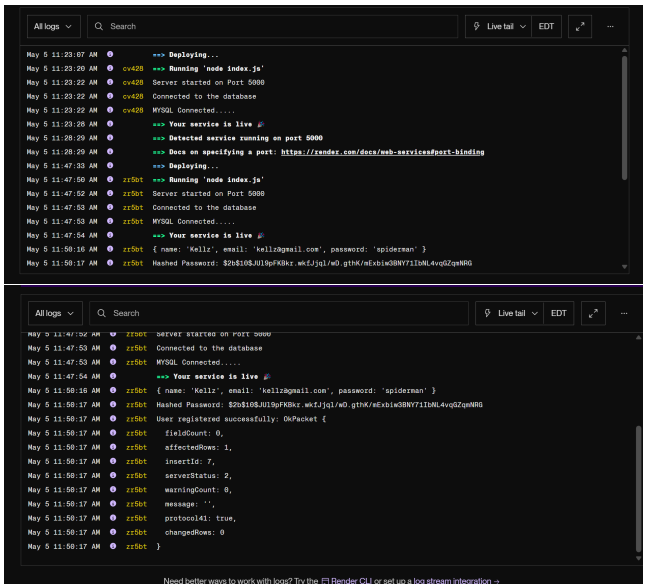

Figure 6. Webhost traffic

Security was also a primary concern, particularly in relation to user authentication. Implementing password hashing was crucial to protect user credentials and maintain application integrity. This step added a necessary layer of defense against potential breaches or data leaks.

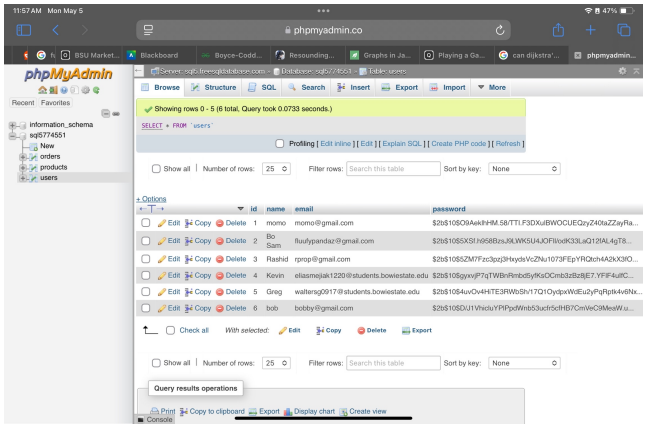

Figure 7. Customer passwords are hashed to ensure data protection

User interface and design consistency presented another set of challenges. Sizing issues across different devices and resolutions affected the overall usability of the platform. These were addressed through responsive design techniques and iterative testing to optimize layout across a range of screen sizes.

Lastly, ensuring that registration data was accurately stored and seamlessly integrated into the login process was fundamental to user experience. This required careful management of backend logic to authenticate users based on previously stored credentials, reinforcing the need for a stable and secure user management system.

Overall, overcoming these challenges contributed to the successful implementation of a robust, secure, and user-friendly mar-

ketplace platform.

6 Conclusion

The creation of the BSU Marketplace application presented a valuable opportunity to navigate real-world web development challenges while building a fully functional application. Throughout the development process, critical problems such as database connectivity, secure user authentication, file handling, and responsive UI design were successfully addressed. Implementing secure password hashing, resolving pathing issues for image uploads, and ensuring proper storage and retrieval of registration data were vital to building a reliable and user-friendly platform.

Choosing the right web host and database solution laid the foundation for scalability and long-term stability. The resolution of these challenges not only contributed to the project's success but also provided deeper insights into the complexities of full-stack development, security considerations, and user experience design.

This project demonstrates the importance of integrating technical precision with thoughtful design decisions in order to deliver a seamless and secure online marketplace experience.