

ONLINE BOOK EXCHANGE SYSTEM

YE JUNHONG

Siti Zahidah Abdullah

*Fakulti Teknologi & Sains Maklumat, Universiti Kebangsaan Malaysia, 43600 UKM Bangi,
Selangor Darul Ehsan, Malaysia*

ABSTRAK

The traditional methods of book exchange are limited by difficulties in finding exchange partners, inconvenient processes, and geographical restrictions. This project aims to develop an online book exchange platform where users can easily exchange, share, and acquire used books. The platform allows users to upload book information, browse available books, and make exchange requests. Additionally, it provides features such as book reviews, comments, and chat functions to enhance user interaction. By utilizing category tags and search functions, the platform helps users find books of interest quickly and accurately. The system is designed to overcome the limitations of traditional book exchanges, providing a more convenient and efficient way for users to find and exchange books.

INTRODUCTION

With the rapid development of internet technology, online platforms have transformed how individuals interact and exchange resources. Traditional book exchange methods, although culturally enriching, are often fraught with limitations such as difficulty in finding suitable exchange partners, inconvenient processes, and geographical restrictions. These constraints hinder the efficient and effective exchange of books, limiting access to literary resources and curbing the growth of a vibrant reading community.

Research indicates that traditional offline book exchanges face significant challenges in matching users with suitable exchange partners, resulting in inefficient exchange processes and limited user engagement (Johnson, 2019). Offline exchanges are further hampered by geographical barriers, restricting users' ability to connect with a broader community of book enthusiasts (Rao & Kapoor, 2020). These limitations highlight the need for an innovative solution that leverages digital platforms to facilitate seamless book exchanges.

The proposed online book exchange system aims to address these issues by providing a user-friendly platform where users can easily share, exchange, and acquire books. By integrating features such as book listings, search functions, exchange requests, reviews, comments, and chat options, the system promotes increased interaction and engagement among users. This approach aligns with the growing trend of utilizing digital platforms to enhance community interactions and resource sharing (Liu & Wang, 2021).

One of the critical aspects of this project is to foster a sense of community among users, encouraging them to share their literary resources and experiences. The platform's design incorporates interactive elements that facilitate communication and collaboration, thus enhancing the user experience and promoting a culture of book sharing. This community-driven approach not only makes book exchanges more accessible but also contributes to the sustainability of literary resources by promoting the reuse and recycling of books (Lampinen, 2021).

The system's architecture is designed to be scalable and flexible, allowing for future expansions and the addition of new features. This ensures that the platform can grow alongside its user base, continually adapting to meet the evolving needs of the community. By employing agile development methodologies, the project aims to deliver a high-quality product that meets user expectations and provides a robust solution to the limitations of traditional book exchanges (Rubin & Guth, 2023).

In summary, the development of the online book exchange system is driven by the need to overcome the inefficiencies of traditional book exchanges and to promote a more inclusive and engaging platform for book enthusiasts. By leveraging digital technology and fostering community interaction, this project aims to transform the way books are exchanged, making it

easier for users to find and share literary resources and thereby enhancing the overall reading experience.

METHODOLOGY

The methodology for the development of the Online Book Exchange System is centered on Agile principles, employing the Scrum framework to facilitate iterative and incremental development. This approach ensures flexibility, adaptability, and continuous improvement based on user feedback and testing results throughout the project lifecycle.

Analysis Phase

The analysis phase began with gathering detailed requirements from potential users of the platform. A survey was conducted using Google Forms to collect data on user preferences, desired features, and pain points with existing book exchange systems. The survey, accessible via <https://forms.gle/2Uz3PWLahhUFhT9Z9>, was distributed to a diverse group of respondents to ensure comprehensive feedback. The collected data provided valuable insights that shaped the functional and non-functional requirements of the system. Key areas of focus included user registration, book listing, search functionalities, exchange mechanisms, and communication features.

Design Phase

In the design phase, the primary objective was to create a robust system architecture and an intuitive user interface. The architectural design aimed to ensure scalability, performance, and security. Key components such as user registration, book listing, search functionalities, exchange mechanisms, and communication features were meticulously planned.

The database schema was designed to efficiently manage user data, book information, and transaction records, emphasizing data integrity and optimized performance. The user interface was designed to be visually appealing and easy to navigate, with a focus on enhancing user

experience. Initial low-fidelity prototypes were created to outline the user journey, followed by high-fidelity prototypes that provided a detailed representation of the final design.

Implementation Phase

The implementation phase involved coding and development based on the specifications and designs from the previous phases. Development was carried out in iterative sprints, each focusing on delivering specific features and functionalities. The frontend was built using HTML, CSS, and JavaScript to create a responsive and user-friendly interface, while AJAX was employed to enable dynamic content updates without page reloads. For the backend, PHP and MySQL were utilized to handle server-side processing and database management. Secure coding practices, including the use of prepared statements and session validation, were implemented to protect user data. A MySQL database was established to store user information, book details, transaction records, and user reviews, with proper indexing and query optimization ensuring fast data retrieval. Throughout the implementation phase, continuous integration and testing were performed to promptly identify and resolve issues, with code reviews and automated testing tools used to maintain code quality and functionality.

Testing Phase

The testing phase was critical to ensuring the reliability and performance of the Online Book Exchange System. Various testing activities were conducted, including unit testing, integration testing, system testing, and regression testing, to ensure the system met its specified requirements. Specific testing activities such as performance testing, security testing, compatibility testing, and usability testing were conducted to validate the system's robustness and user-friendliness. Testing was carried out iteratively, with each round followed by bug fixes and enhancements, and user feedback was integrated to refine the system and improve usability.

Challenges and Solutions

During the development process, several challenges were encountered and addressed to ensure the project's success. One significant challenge was security concerns; initially, password storage used MD5 hashing, which posed a security risk due to its vulnerability to brute force attacks. The

system was subsequently updated to use bcrypt, a more secure hashing algorithm, enhancing the security of user data. Performance issues also arose as the user base grew, causing database queries to slow down. To address this, optimization techniques such as indexing and pagination were implemented to improve query performance. Additionally, the complexity of the user interface presented a challenge, with users initially finding the book exchange process confusing. The interface was redesigned to be more intuitive, incorporating clear instructions and real-time feedback mechanisms using AJAX, which significantly improved the user experience. By addressing these challenges, the system's security, performance, and user experience were significantly enhanced, contributing to the overall success of the project.

RESULTS AND DISCUSSION

The Online Book Exchange System has been successfully developed and all associated documentation has been completed. Throughout the development process, modern web technologies were employed to ensure that the platform met its intended goals. The backend was developed using PHP to handle user authentication, book management, and exchange functionalities. The frontend was created with HTML, CSS, and JavaScript, focusing on providing a seamless user experience through intuitive navigation and clean design. A robust MySQL database was used to efficiently store and manage data, ensuring that user data, book listings, exchange requests, and chat logs are securely stored. This comprehensive approach to development and testing ensures that the system not only meets its functional requirements but also provides a smooth and engaging user experience.

Upon accessing the website, users are greeted with a registration interface, where they can enter their username, email, and password to create an account. Once registered, users can log in and access the main features of the platform. The homepage features a navigation bar with categories for different genres, a search bar for finding specific books, and sections for viewing posts from followed users and engaging in chats. Users can easily browse through recommended books, create new listings, and request exchanges with other users.

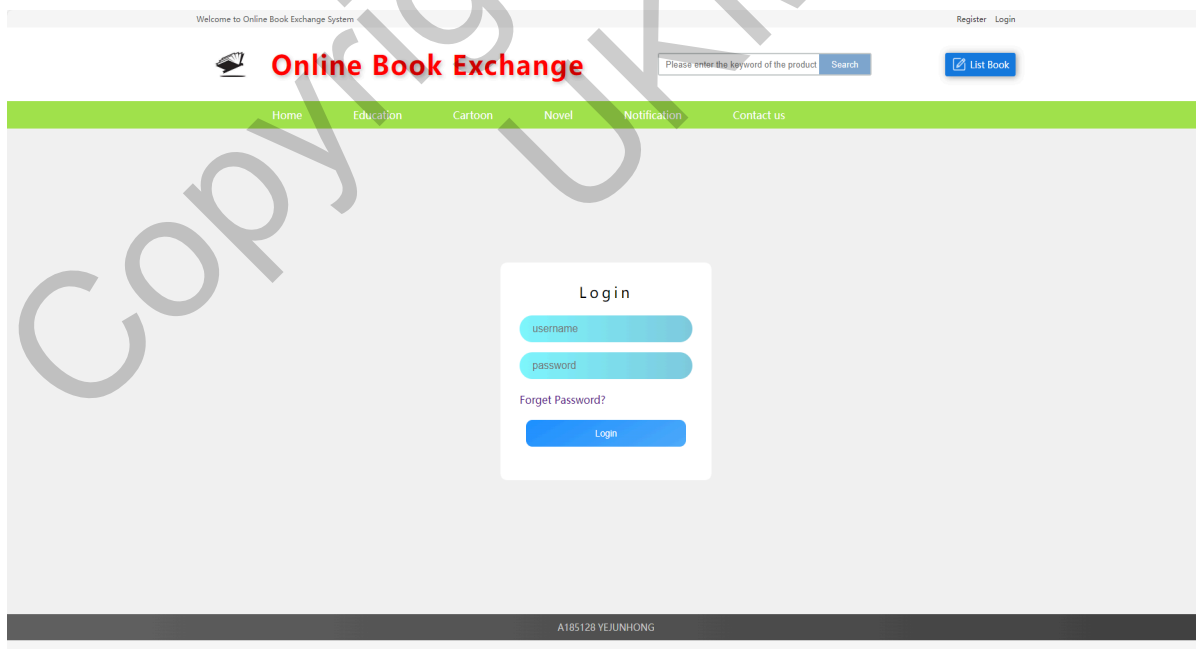
The system's main functionalities include:

User Registration and Login: New users can create an account by providing their details and then log in to access the platform's features. The registration and login processes are simple and secure, ensuring a smooth onboarding experience.



The screenshot shows the 'Register' page of the 'Online Book Exchange' system. The page features a header with the site name and a search bar. A navigation menu includes 'Home', 'Education', 'Cartoon', 'Novel', 'Notification', and 'Contact us'. The main content area contains a 'Register' form with three input fields: 'username', 'password', and 'confirm password', followed by a 'Register' button. The footer includes the text 'A185128 YEJUNHONG'.

Figure 1 register page



The screenshot shows the 'Login' page of the 'Online Book Exchange' system. The page features a header with the site name and a search bar. A navigation menu includes 'Home', 'Education', 'Cartoon', 'Novel', 'Notification', and 'Contact us'. The main content area contains a 'Login' form with two input fields: 'username' and 'password', followed by a 'Login' button and a 'Forget Password?' link. The footer includes the text 'A185128 YEJUNHONG'.

Figure 2 Login page

Book Listing and Management: Users can list books they want to exchange by providing details such as title, author, and condition. The system allows users to edit or delete their listings as needed, ensuring that the information remains up-to-date.

Welcome to Online Book Exchange System Profile [Logout](#)

Online Book Exchange [Search](#) [My messages](#) [List Book](#)

Home Education Cartoon Novel Notification Contact us

List book

Name:

Classification:

author:

Cover Picture: [Upload Picture](#)

Email:

Tel:

Address:

Details:

Figure 3 Book listing page

Online Book Exchange [Search](#) [My messages](#) [List Book](#)

Home Education Cartoon Novel Notification Contact us

YE [List Book](#)

[My List](#) [My comment](#)





| | | | |
|---|--|---|---|
|  | <p>Clean Code unavailable</p> <p>Author: Robert C. Martin</p> <p>Email: A185128@siswa.ukm.edu.my</p> <p>Tel: 01123343698</p> <p>Address: Bangi</p> <p>Edit Comment</p> |  | <p>the Old Man and the Sea unavailable</p> <p>Author: Hemingway</p> <p>Email: 50%new</p> <p>Tel: 01123343698</p> <p>Address: Bangi</p> <p>Edit Comment</p> |
|  | <p>Head First Design Patterns</p> <p>Author: Eric Freeman</p> <p>Email: 80%new</p> <p>Tel: 01123343698</p> <p>Address: Bangi</p> <p>Edit Comment</p> |  | <p>Romeo and Juliet unavailable</p> <p>Author: Shakespeare</p> <p>Email: Slightly damaged</p> <p>Tel: 01123343698</p> <p>Address: Bangi</p> <p>Edit Comment</p> |

Figure 4 Book management page

Search: The platform provides robust search functionality, enabling users to find books based on various criteria such as genre, author, or title. This feature helps users quickly locate books of interest.

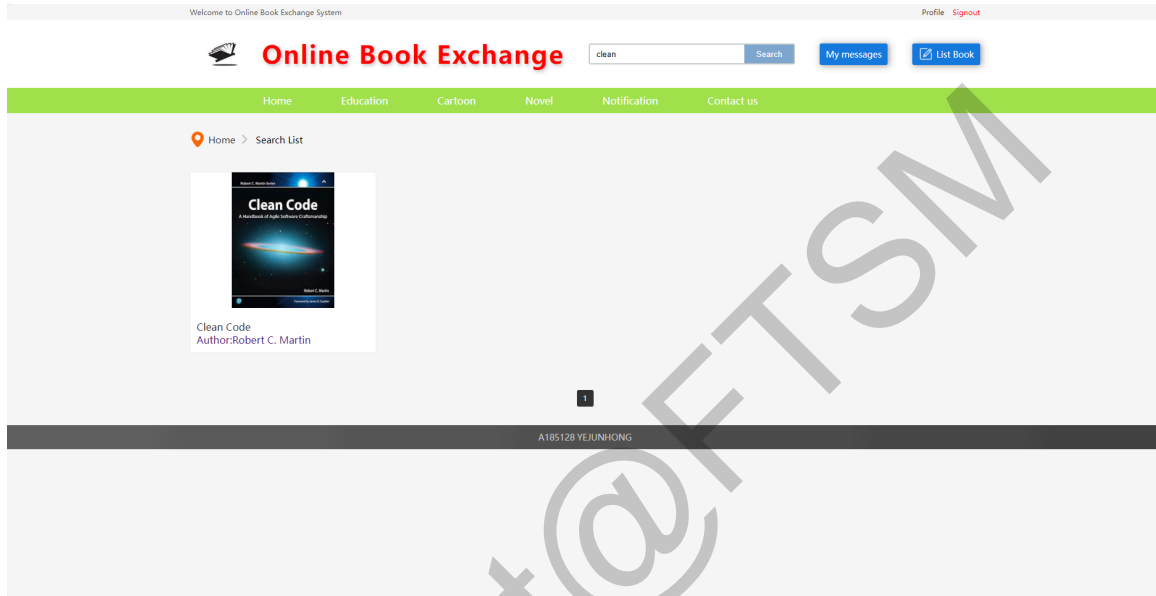


Figure 5 Search page

Exchange Requests: Users can send and receive exchange requests, facilitating the process of book swapping. The system provides notifications for new requests and updates on ongoing exchanges, ensuring that users stay informed throughout the process.

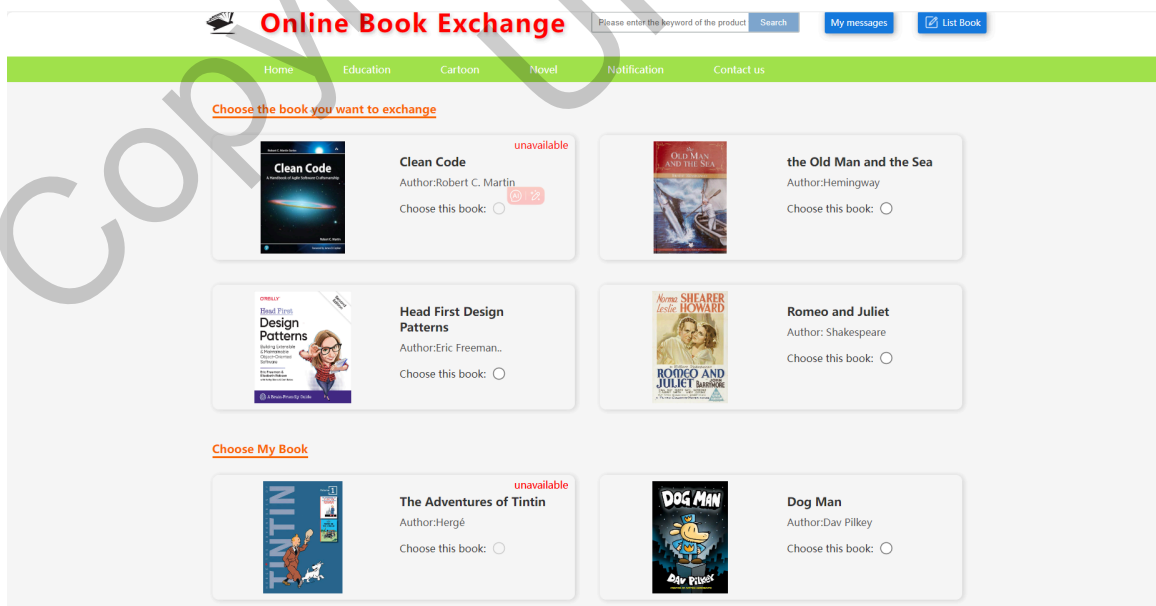


Figure 6 Exchange page

Usability Testing

Usability testing is a crucial phase in the development of the Online Book Exchange System to ensure the platform meets user needs and provides a seamless user experience. The primary objectives of usability testing were to evaluate the system's ease of use, navigation, design, functionality, performance, and overall user satisfaction.

The usability testing was conducted through an online survey distributed to users of the Online Book Exchange Platform. A total of 24 respondents participated in the survey, providing detailed feedback on various aspects of the platform. The survey included questions designed to assess user experience on a scale from 1 to 5, with 1 being the lowest and 5 being the highest score.

Table 1 usability test result

| ID | Question | Description | Score |
|------|---|---|-------|
| U001 | How would you rate the ease of navigation on the platform? | Users rated the ease of navigation on a scale from 1 (Very Difficult) to 5 (Very Easy). | 3.8/5 |
| U002 | Are the features of the platform easy to understand and use? | Users rated the ease of understanding and using the features on a scale from 1 (Very Complicated) to 5 (Very Simple). | 3.7/5 |
| U003 | How would you rate the overall design and layout of the platform? | Users rated the design and layout on a scale from 1 (Very Poor) to 5 (Excellent). | 3.9/5 |
| U004 | How satisfied are you with the platform's functionalities? | Users rated their satisfaction with functionalities on a scale from 1 (Very Dissatisfied) to 5 (Very Satisfied). | 3.9/5 |

| | | | |
|------|---|---|-------|
| U005 | How would you rate the platform's performance (speed/responsiveness)? | Users rated the performance in terms of speed and responsiveness on a scale from 1 (Very Slow) to 5 (Very Fast). | 4.0/5 |
| U006 | Do you find the platform's notifications and updates useful? | Users rated the usefulness of notifications and updates on a scale from 1 (Not Useful) to 5 (Very Useful). | 4.0/5 |
| U007 | Would you recommend the platform to others? | Users rated their likelihood of recommending the platform on a scale from 1 (Definitely Not) to 5 (Definitely Yes). | 4.1/5 |

The survey responses indicate that the majority of users found the platform easy to navigate and use, with satisfactory design and layout. Users were generally satisfied with the platform's functionalities and performance, and they found the notifications and updates useful. Additionally, a significant portion of users expressed their willingness to recommend the platform to others.

Discussion

The usability testing results highlight several key strengths and areas for improvement in the Online Book Exchange System. Firstly, the platform's ease of navigation and use received favorable feedback, with an average score of 3.8 for navigation and 3.7 for feature usability. While users found the platform relatively easy to navigate, there is room for improvement in making the features more intuitive and user-friendly. Enhancements in this area will help users interact with the platform more efficiently and enjoyably.

The design and layout of the platform were well-received, earning a score of 3.9. Users generally appreciated the visual appeal and organization of the platform. Continued refinement of design elements can further enhance the user experience, making the interface not only more aesthetically pleasing but also more functional. Focusing on clean, user-centered design principles will ensure that the platform remains accessible and engaging.

In terms of functionalities and performance, users rated their satisfaction highly, with scores of 3.9 and 4.0, respectively. These results suggest that the platform performs well and meets user expectations in terms of speed and responsiveness. Maintaining this high level of performance is crucial, and ongoing monitoring and optimization will be necessary to ensure that the platform continues to operate smoothly as the user base grows.

Users also found the notifications and updates feature to be very useful, with a score of 4.0. This feature plays a significant role in keeping users informed and engaged, enhancing their overall experience on the platform. Ensuring that notifications are timely, relevant, and unobtrusive will help maintain their effectiveness and user satisfaction.

Finally, the likelihood of users recommending the platform to others received a score of 4.1, indicating strong user endorsement. This is a crucial metric for the platform's growth and adoption. Positive word-of-mouth from satisfied users can significantly boost the platform's visibility and attract new users. Ensuring a consistently high-quality user experience will help sustain this positive feedback and encourage more recommendations.

The feedback gathered from usability testing will be used to make further improvements to the platform. Key focus areas include enhancing the intuitiveness of features, refining design and layout, and ensuring continuous performance optimization. These enhancements will help deliver a more seamless and satisfying user experience, ultimately driving higher user engagement and retention. By addressing the identified areas for improvement, the Online Book Exchange System can better meet the needs of its users and achieve its goal of creating a vibrant, interactive community for book lovers.

CONCLUSION

Overall, the Online Book Exchange System project has been successfully developed and has passed the beta phase. Throughout the project, various components were developed, including user registration and login, book listing and management, search and filter functionalities, exchange requests, and a chat system. Although many challenges were encountered during

development, they were finally resolved through various methods, reflecting the learning and skills acquired at this stage. This project also laid the foundation for future studies and careers, providing important insights and skills that will benefit future endeavors in both academic and professional settings.

System Strengths

The developed system features a user-centric design with an intuitive and user-friendly interface, making it easy for users to navigate and interact with various features. It includes comprehensive functionalities such as book listing, searching, exchanging, and chatting, providing a rich and engaging user experience. The system is compatible with multiple browsers, ensuring a consistent experience for all users. Extensive usability testing confirmed that users could complete tasks smoothly without confusion or errors, indicating a well-designed and efficient user experience.

System Weaknesses

While the Online Book Exchange System has been successfully developed, several shortcomings still need to be addressed with additional resources and time. One significant issue is scalability; although the current system performs well, further optimization and enhanced infrastructure are required to accommodate a larger user base. Additionally, the system is currently limited to web-based access, which may restrict accessibility for users who prefer mobile devices. Developing a mobile version would significantly broaden its user base and enhance usability. These works will be updated gradually in the future to meet the needs of more users.

ACKNOWLEDGEMENTS

First and foremost, I wish to express my deepest gratitude to Allah for His divine guidance and blessings, which have enabled me to successfully complete this project.

I am profoundly thankful to Dr. Siti Zahidah Abdullah for her exceptional mentorship and unwavering support as my supervisor. Her extensive knowledge, insightful advice, and constant encouragement have been instrumental in my academic development throughout the

research process. Her guidance on the intricacies of research content, academic writing, methodology, and data analysis has significantly enhanced my scholarly abilities.

I extend my heartfelt appreciation to the Faculty of Information Science and Technology (FTSM) for providing a conducive research environment and invaluable resources. The faculty's vibrant academic culture and supportive atmosphere have greatly enriched my learning experience, offering a robust platform for my research endeavors.

Lastly, I am deeply grateful to my family, friends, and classmates for their unwavering support, understanding, and encouragement throughout this project. Their belief in me and their steadfast support have been a source of immense strength, helping me to overcome challenges and successfully complete this research.

REFERENCES

- Johnson, D. (2019). Enhancing Community Through Book Swap Programs. *Public Library Journal*, 38(1), 45-56. Available at: [Public Library Journal](#)
- Lampinen, A. (2021). *The Trouble With Sharing: Interpersonal Challenges in Peer-to-Peer Exchange*. Morgan & Claypool Publishers.
- Liu, Y., & Wang, Y. (2021). The Rise of Online Book Communities: A Social Network Analysis. *Journal of Information Science*, 47(4), 486-500.
- Rao, V., & Kapoor, A. (2020). Traditional Libraries in the Digital Age: The Role of Online Book Exchanges. *Information Science Journal*, 15(2), 112-125. Available at: [Information Science Journal](#)
- Rubin, J. and Guth, S. eds., 2023. *The guide to COIL virtual exchange: Implementing, growing, and sustaining collaborative online international learning*. Taylor & Francis.

YE JUNHONG (A185128)

Ts.Dr.Siti Zahidah Abdullah

Fakulti Teknologi & Sains Maklumat

Universiti Kebangsaan Malaysia

Copyright@FTSM
UKM