Research Proposal

Master's Thesis (Coursework) (1st year)

Software and System Engineering Programme

School of Software Engineering / FCS

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Title: Blockchain Based Mobile Application for Bookcrossing

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Date of Proposal's Submission: January 30rd, 2023

Moscow, 2023

Abstract

The idea for an app for exchanging printed books arose from the need for a more convenient and eco-friendly way for people to access books. Many people had large collections of books that they no longer needed, and there was also a growing concern about the environmental impact of producing and shipping new books. At the same time, there was a growing community of book lovers who wanted a more affordable and sustainable way to build their personal libraries. The popularity of book exchange programs has grown in recent years as a way to access books more affordably and sustainably. However, traditional book exchange apps have faced issues with security and transparency, leading to a need for a more secure platform for book exchange. The main purpose of this work is to solve the problems of security and transparency in the exchange of books. Thanks to blockchain technology, a decentralized book exchange transaction management system will be created, ensuring that all transactions are recorded in a public ledger that cannot be changed. The following methods will be used to develop a mobile application:

1. Research and analysis of existing book exchange programs and their limitations.
2. Development of a decentralized blockchain platform for managing book exchange transactions.
3. Integration of a user-friendly interface for convenient use of the application.
4. Testing and debugging the application to ensure its functionality and security.

The expected result is a bookcrossing blockchain-based mobile application, a secure and transparent book exchange platform. A decentralized blockchain platform will provide a secure and tamper-proof record of all book exchange transactions, and a user-friendly interface will make the application accessible to a wide range of users. By providing a secure and transparent book sharing platform, the app will help grow the book sharing community and help ensure book access is sustainable and affordable.

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Introduction

Much of the research on book sharing apps is mainly focused on understanding user behavior, such as how people choose to share books and the factors that motivate them to participate in book sharing. Other areas of research include the impact of book sharing apps on the publishing industry, the sustainability of such apps, and the potential for gamification and social features to increase engagement. In addition, some studies [1] have explored the technical challenges of building book-sharing applications, such as developing secure and efficient methods for tracking book ownership and facilitating peer-to-peer transactions. Today, you can find a sufficient number of applications on the network that provide the ability to exchange books. All these applications are essentially very similar to each other, and it will be difficult for the user to choose one of them, since they are all similar. To make the product unique, it is necessary to take the opportunity to introduce the concept of blockchain technology [2] into the product being developed.

Unfortunately, there hasn't been extensive research on the use of blockchain for book-sharing applications. However, the concept of using blockchain to share books can be attractive for various reasons, such as providing secure, transparent, and decentralized tracking of book ownership and facilitating peer-to-peer transactions. Some startups and organizations are exploring this area, and it could be a promising area for future research and development. Thanks to this technology, the solution proposed in this study will differ from existing solutions in several ways:

1. Security and transparency: The use of blockchain technology can provide a secure and transparent system for tracking book ownership and transactions.
2. Decentralization. Unlike centralized systems in which the database is controlled by one person, blockchain technology allows the creation of decentralized systems in which records are maintained by several users.
3. Tamper-Resistant Records [3]: Records on the blockchain cannot be modified or deleted, ensuring data integrity.
4. Incentives: The use of blockchain-based tokens or other incentives may encourage users to participate in the book exchange network.
5. Community driven: The decentralized nature of the system can facilitate community decision making, such as setting rules and standards for the book exchange network.

The idea of creating a blockchain-based print book sharing app came about from the need to improve existing book sharing platforms. It arose due to the following factors:

1. There is a growing interest in blockchain technology, which opens up new opportunities for various industries, including ecosystems for exchanging things.
2. Dissatisfaction with existing centralized book exchange platforms that require providing personal data or charging for services.
3. Desire to improve the book exchange process, including increased transparency and transaction security.
4. Growing popularity of ecosystems for sharing things, such as book sharing, that help reduce resource use and improve economic efficiency.

Thesis (Research) Statement

With the increasing popularity of book crossing, the need for a secure and decentralized platform that allows users to exchange books has become imperative. The traditional book sharing methods are often plagued by issues such as lost books, untraceable transactions, and a lack of accountability. By integrating blockchain technology, mobile applications for book crossing can offer users a secure, transparent, and decentralized platform for tracking and exchanging books. The use of smart contracts can ensure that the transactions are recorded and executed in a transparent and tamper-proof manner, thereby providing a high level of accountability and trust between users. Additionally, the decentralized nature of blockchain eliminates the need for intermediaries, thereby reducing costs and promoting the sharing of literary resources. The aim of this research is to evaluate the feasibility and potential benefits of incorporating blockchain technology in mobile applications for book sharing. Through this study, we hope to demonstrate how blockchain technology can enhance the user experience and promote the sharing of literary resources, thereby creating a more sustainable and equitable book sharing ecosystem. The results of this research will be valuable not only for book lovers but also for the wider community, as they can contribute to the development of a more secure, efficient, and sustainable platform for book sharing.

Methodology Approach

The bookcrossing blockchain mobile application can use various approaches and procedures to provide a safe and efficient platform for users. This application may have the following features:

1. User registration and authentication. The app will require users to register and create an account in order to participate in BookCrossing.
2. Book Management: Users can add books to the platform by providing information such as title, author, photo, and short description. The details will be stored in a decentralized database accessible to all users.
3. Book Sharing: The main purpose of the app is to facilitate the exchange of books between users. Users can borrow and borrow books from each other, and the details of the transaction will be recorded on the blockchain. This provides a secure and transparent record of all ledger transactions.
4. Reputation system: A reputation system can be implemented in the application to encourage users to behave honestly. Points can be awarded to users based on their actions, such as providing and returning books on time, providing accurate information about books, and more.
5. Payment system: To support the lending and borrowing of books, the application may include a payment system that allows users to transfer funds to each other. The payment system can be based on cryptocurrency or other digital assets.
6. Notifications. Users can be notified about various events, such as when a book is available for borrowing, when a book is returned, etc. Notifications can be based on actions recorded on the blockchain.
7. Book Search: Users can search for books by various criteria such as title, author, and genre. The app can also make recommendations based on the user's reading history and preferences.
8. User Profiles: Users can create a profile that includes their book collection, reading history, and reputation score. Profile information can be stored in a decentralized database and be available to all users.

The development of a mobile application may consist of the following steps:

1. Collection and analysis of requirements. The first step is to collect requirements from stakeholders such as users, book clubs, and libraries to understand their needs and expectations for the application. Based on the requirements, the team can create a detailed specification for the application.
2. Architecture design. The next step is to design the application architecture, including the database, blockchain, and other components. This will ensure that the application meets the requirements and provides users with a scalable and secure platform.
3. Development and testing. At this point, you can start coding and testing the application by following the application's architecture. The application can be tested on various devices and platforms to ensure compatibility.
4. Deployment: Once an application is developed and tested, it can be deployed to the AppStore and made available to users. The deployment process will also include setting up the blockchain and other infrastructure components.
5. Service and support. Once deployed, the application will require ongoing maintenance and support to address bugs, security issues, and other issues.

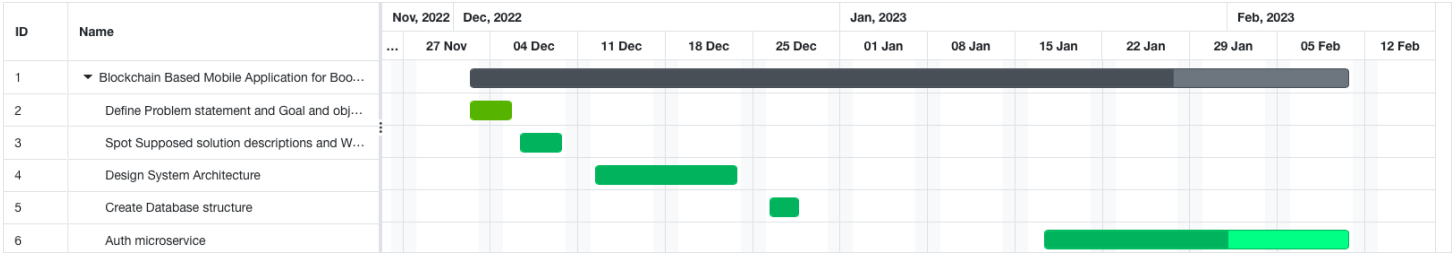
Preliminary (Expected) Results and Discussion

The blockchain-based bookcrossing mobile application is expected to bring a number of benefits and improvements over traditional bookcrossing platforms. Some of the tentative expected outcomes of developing such an application include:

1. Enhanced Security: The use of blockchain technology can provide a secure and transparent book exchange platform. A decentralized database [4] and smart contracts can ensure accurate and secure recording and tracking of ledger transactions, reducing the risk of fraud and errors.
2. Increase trust: An in-app reputation system can encourage users to be honest and provide accurate information about the books they borrow or rent. This can increase trust among users and make the platform a more reliable and trustworthy book community.
3. Increased Efficiency: The use of smart contracts can automate various processes such as book exchange and payment transfer, making the platform more efficient and less likely to make mistakes. The app can also provide real-time notifications of book availability and returns, making it easier for users to manage their book collections.
4. Increased accessibility: The app can be accessed from anywhere, anytime using a mobile device, making book sharing more convenient and accessible for users. A decentralized database can also make it easier for users to find books and connect with other book lovers from all over the world.
5. User interaction. An application can stimulate user interaction by providing features such as book searches, recommendations, and user profiles. The reputation system can also incentivize users to participate in the platform and contribute to the community.
6. Cost Savings: By eliminating intermediaries and relying on blockchain technology, the application can cut costs associated with traditional book exchange platforms. This can make book sharing more accessible to a wider range of users.

In conclusion, the development of a bookcrossing blockchain-based mobile application is expected to bring significant benefits and improvements to the book exchange community. Using blockchain and other technologies, the application can provide users with a secure, efficient, and accessible platform for book sharing and participation in book-related activities.

Work Plan (as seen in December 2022 - January 2023)



As you can see in the Gantt chart, work on the project began in December. At first glance, little work was carried out this month, but these tasks are fundamental in this project. For example, such fundamental aspects as Problem statement, Goal and objectives, Supposed solution descriptions, Workflow should be well developed. Of course, errors could have been made when defining such aspects, but these errors will be corrected during the development process. It is also clearly seen in the diagram that no work was carried out in January. Only on January 15, the process of writing the backend, namely the authorization and registration microservice, was started. At the moment, the task is only 60% completed.

Implications of the Research Work

Book crossing is a popular hobby that involves leaving a book in a public place for someone else to find, read, and then pass on to others. A mobile application based on blockchain technology could greatly enhance this experience by creating a decentralized platform for tracking the movement of books and incentivizing book sharing.

Developing a blockchain-based mobile application for book crossing requires a good understanding of both blockchain technology and mobile app development. It is important to have a clear understanding of the specific blockchain platform you plan to build your app on, as each platform has its own unique features and limitations. For example, you might choose to build your app on Ethereum, which is a popular platform for decentralized applications, or on a more niche platform that is specifically designed for book tracking.

When it comes to mobile app development, it is crucial to focus on user experience and design. The app should be intuitive and easy to use, allowing users to quickly and easily track their book crossing activities. It is also important to consider the security of the user's data and information, as blockchain platforms are known for their enhanced security features.

Finally, it is important to consider the legal and regulatory implications of developing a blockchain-based mobile app for book crossing. Depending on your location, there may be certain restrictions or regulations that you need to comply with, such as data privacy laws or licensing requirements.

In conclusion, developing a blockchain-based mobile app for book crossing requires a comprehensive understanding of blockchain technology and mobile app development [5], a focus on user experience and design, a system for incentivizing book sharing, and an awareness of the legal and regulatory implications of the project.

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