Faculty of Computer Science

System and Software Engineering

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Blockchain Based Mobile Application for Bookcrossing

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BookCrossing is a global book-sharing movement that encourages people to leave books in public places for others to find, read, and pass along.

Blockchain is a way of storing information about transactions or events, where the data is recorded in a chain of blocks. Each block contains information about the previous block, making it impossible to alter the records in the blockchain without the consensus of the entire network. This technology provides security and reliability for data and enables the creation of decentralized systems where there is no central controlling authority.

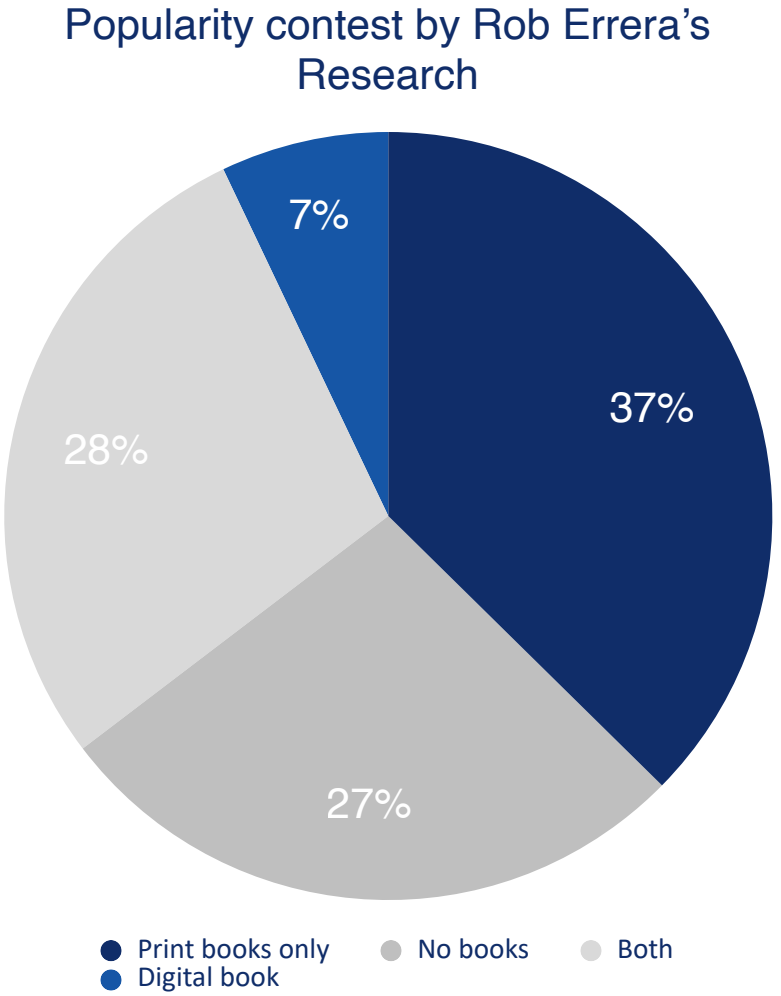
The goal is to design and develop a blockchain-based mobile application for bookcrossing that will provide a secure, transparent, and efficient platform for book sharing among book enthusiasts

Proposed project tasks

- Identify the functional and non-functional requirements
- Explore the potential of blockchain technology for creating a secure and transparent platform
- Investigate the best blockchain platforms and programming languages for developing
- Design the system and user interface to ensure ease of use and adoption by book enthusiasts.
- Address the security and privacy concerns
- Compare existing applications in terms of security, transparency, and ease of use.

Problem Statement

1. Effect of Book Pricing on Reader Volume
2. The problem of tracking books when they are transferred to third parties
3. Environmental issue with paper production costs



Quantitative and Qualitative comparative analysis

	Number of downloads	Rating (Out of 5)	Cost	Platform	Supported languages
Publica	Not available	3.5	Free	iOS, Android	En
READ	Not available	4.2	Free	iOS, Android	En
Scannable	>5000	3.3	Free	iOS	En
BookCrossing .com	Not available	3.1	Free	iOS, Android	En, Es, De, Fr, It, Pt

Book crossing

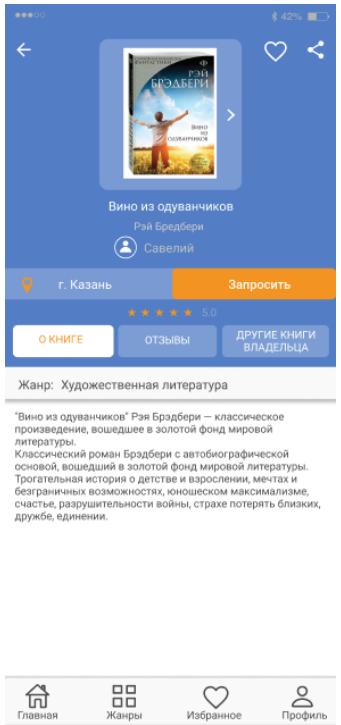
Functional Requirements

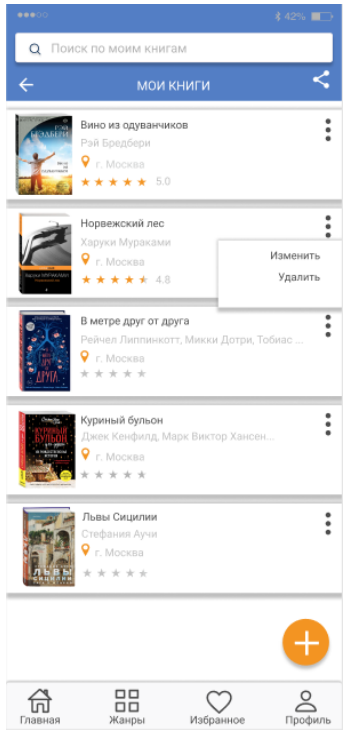
- User Registration and Profile Management
- Book Listing and Search
- Book Lending and Borrowing
- Push Notifications
- Feedback and Ratings

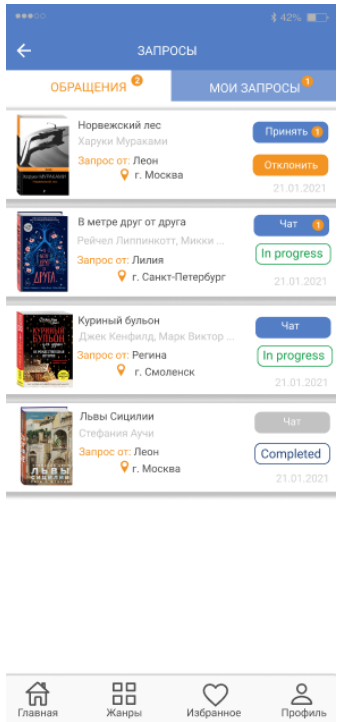
Non-functional Requirements

- Security
- Scalability
- Performance
- User Interface

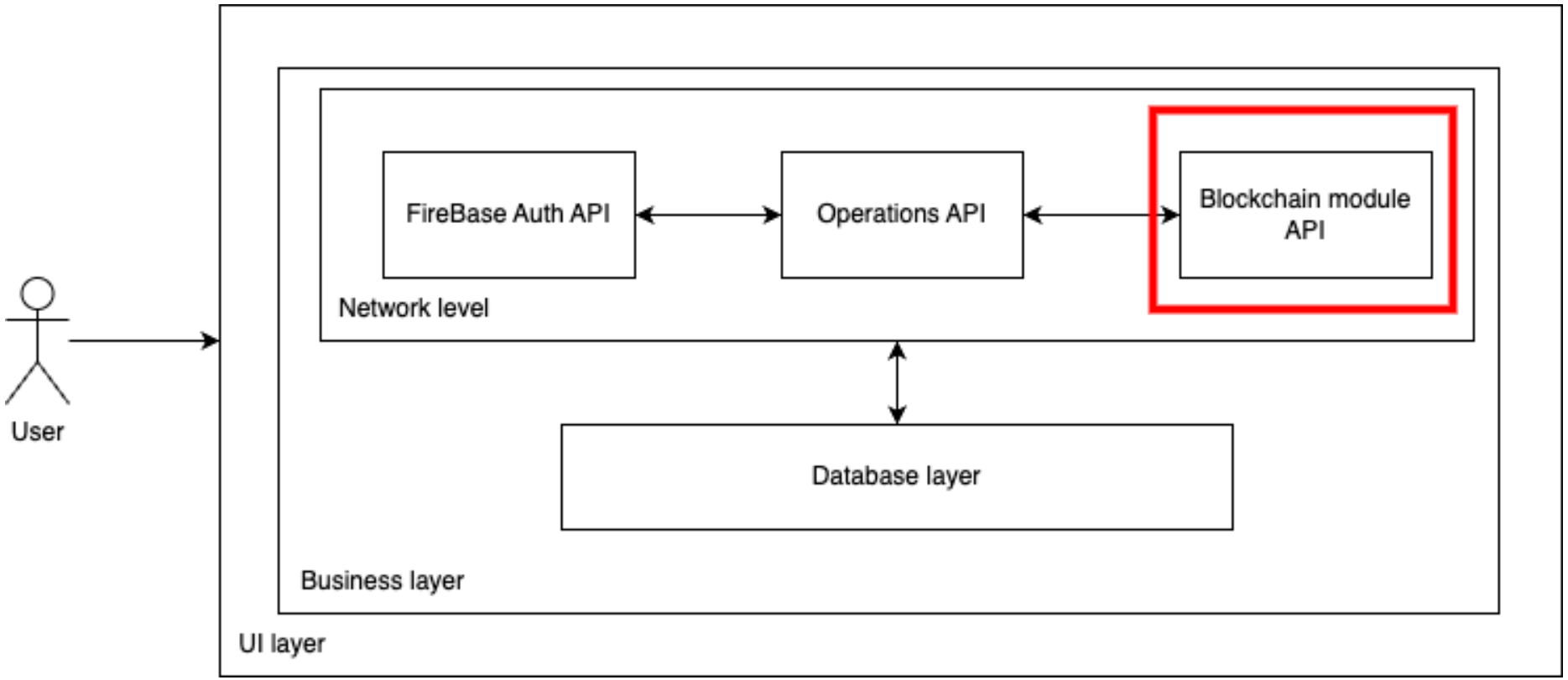
User Interface





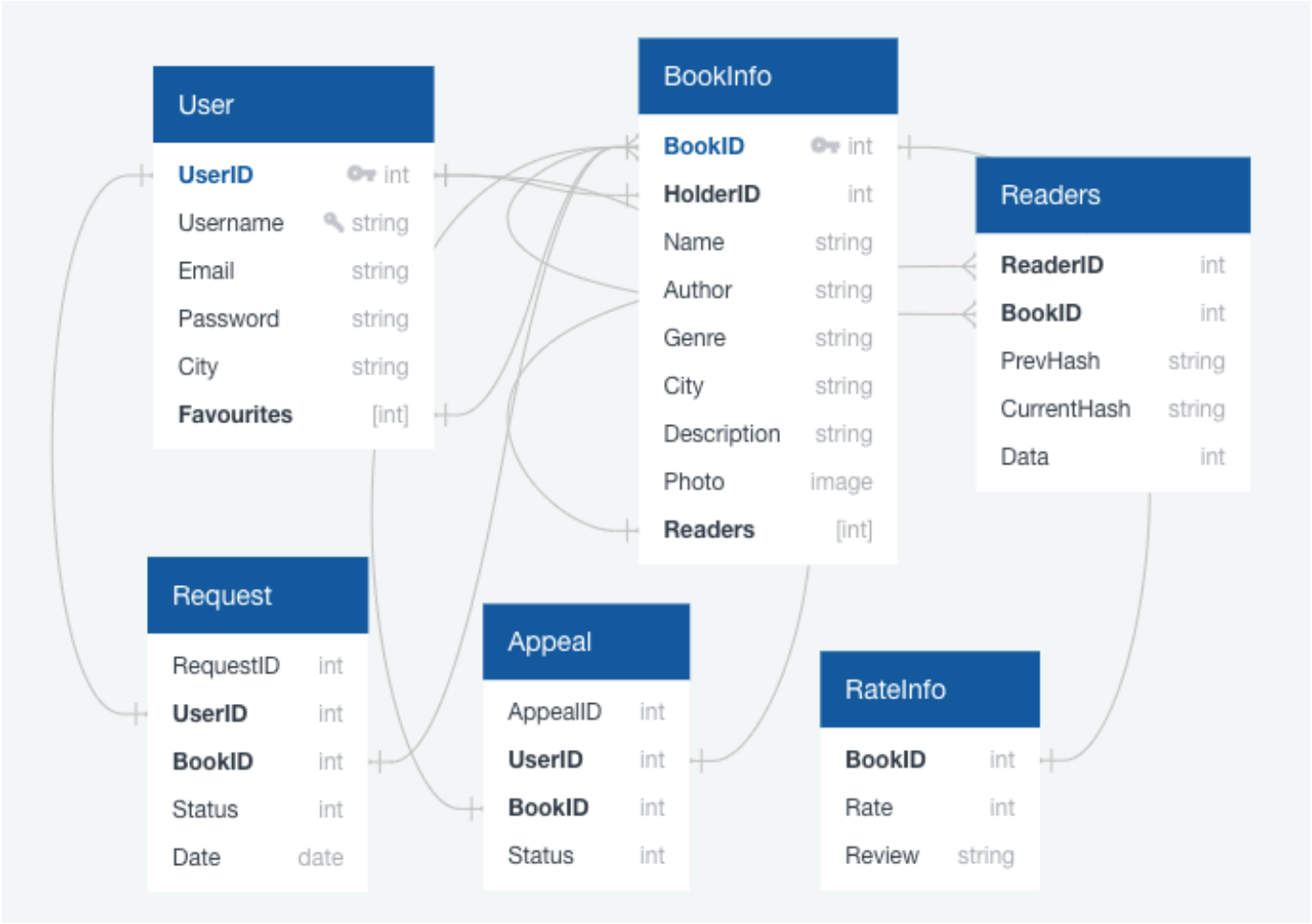


System Architecture



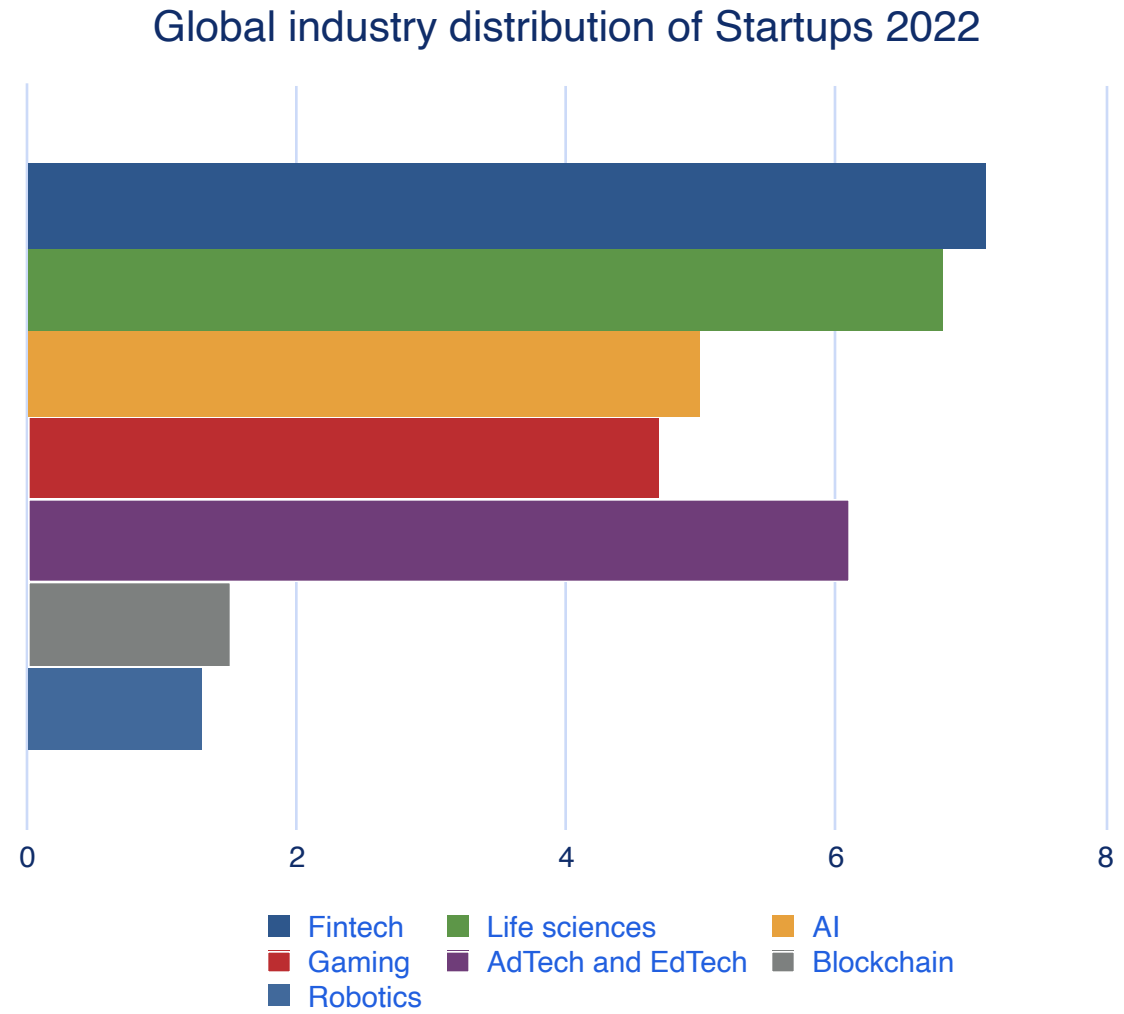
Database Structure

- **Centralised** database
- **Decentralised** database



Methods: Blockchain technology

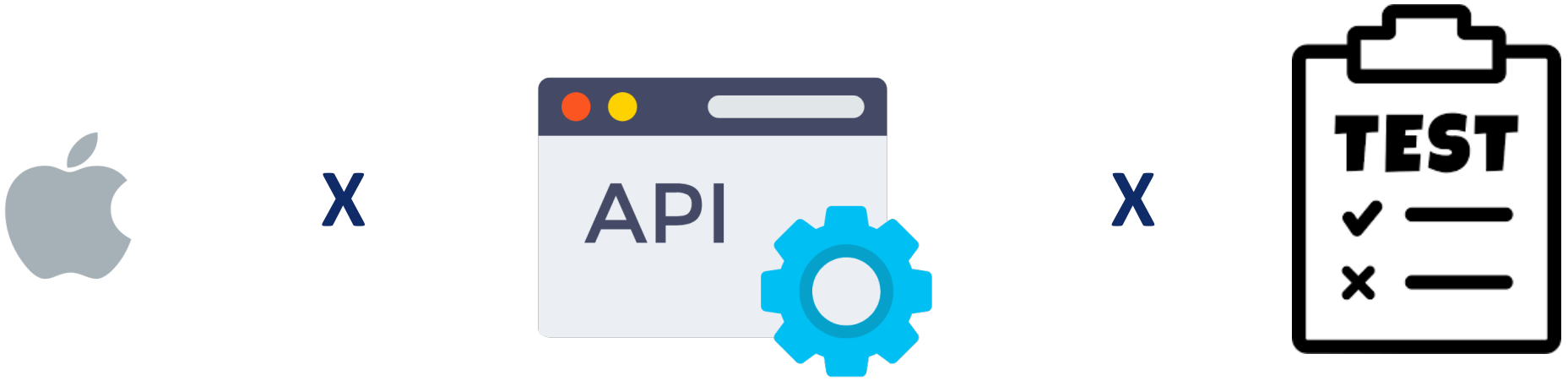
- Security and transparency
- Decentralisation
- Tamper-Resistant Records
- Incentives
- Community driven
- Growing interest in Blockchain technology



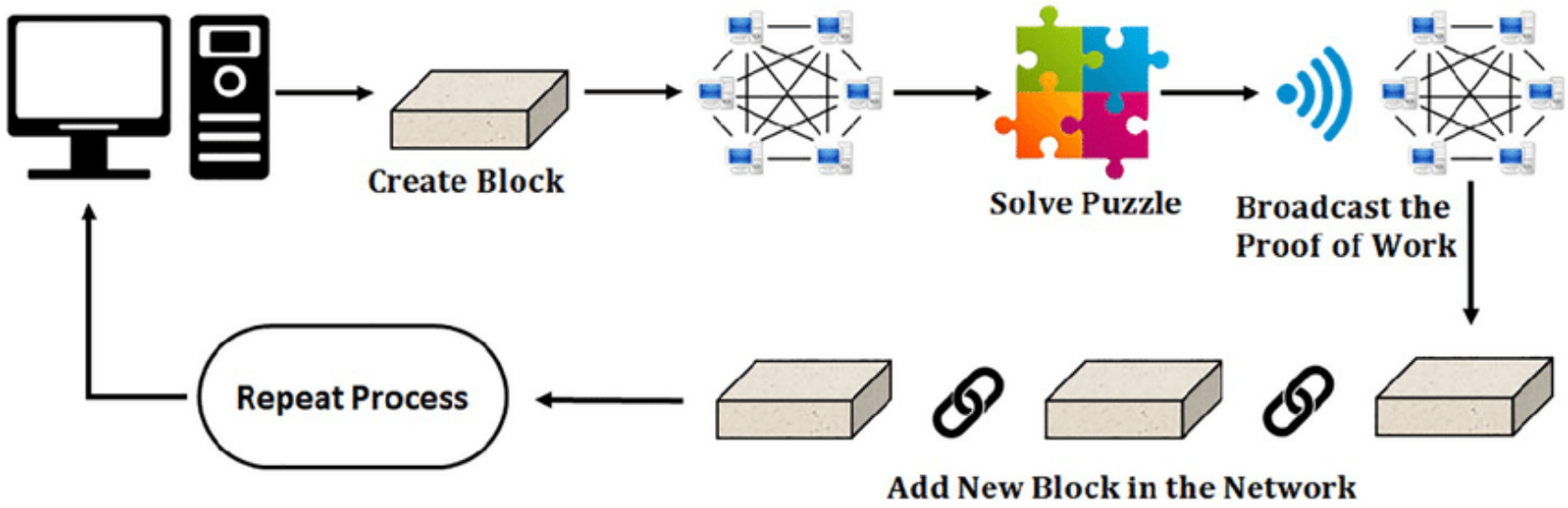
Which Blockchain

?

Methods: Mobile App x API x Testing



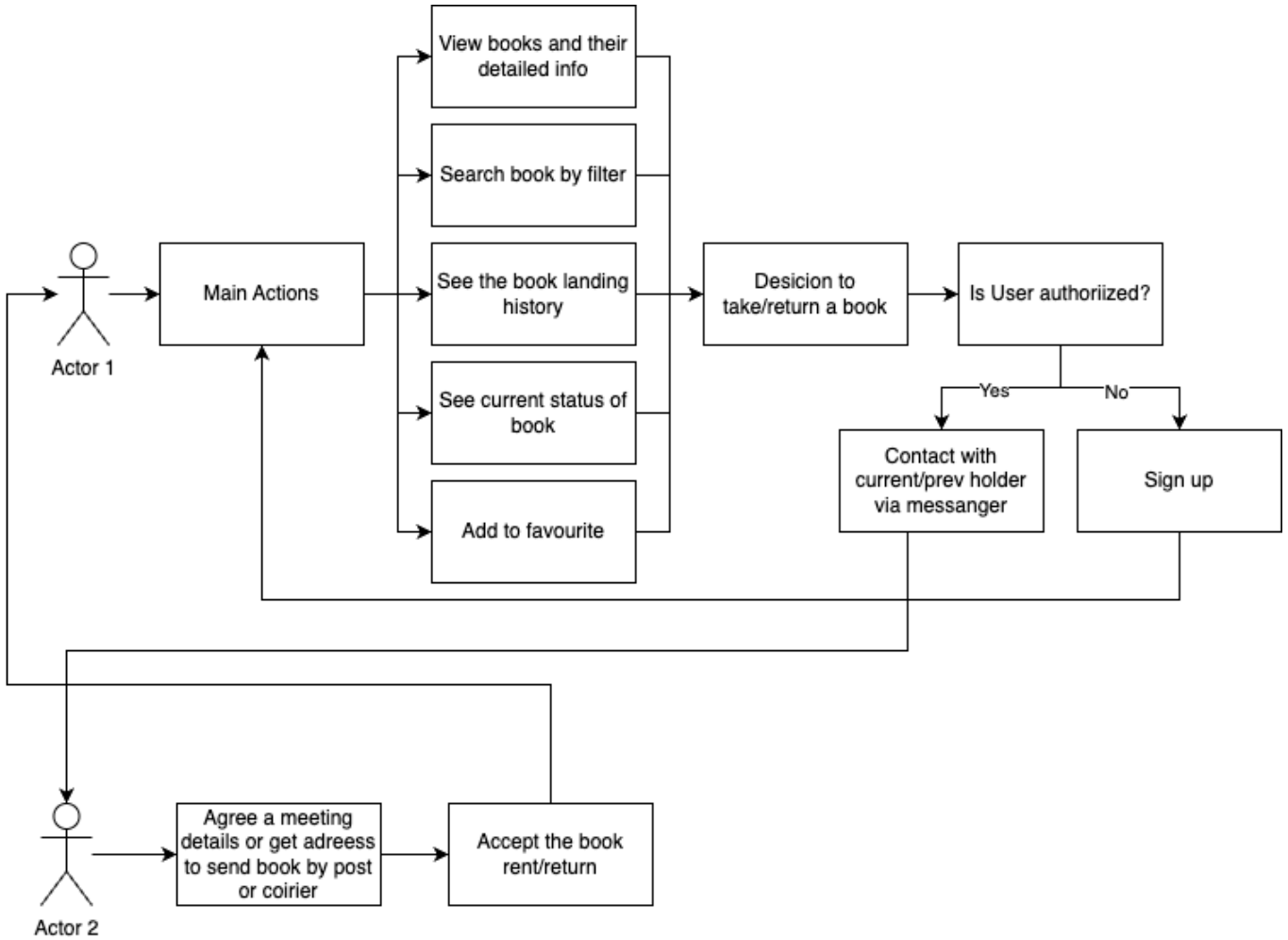
Algorithms: Proof of Work



Workflow

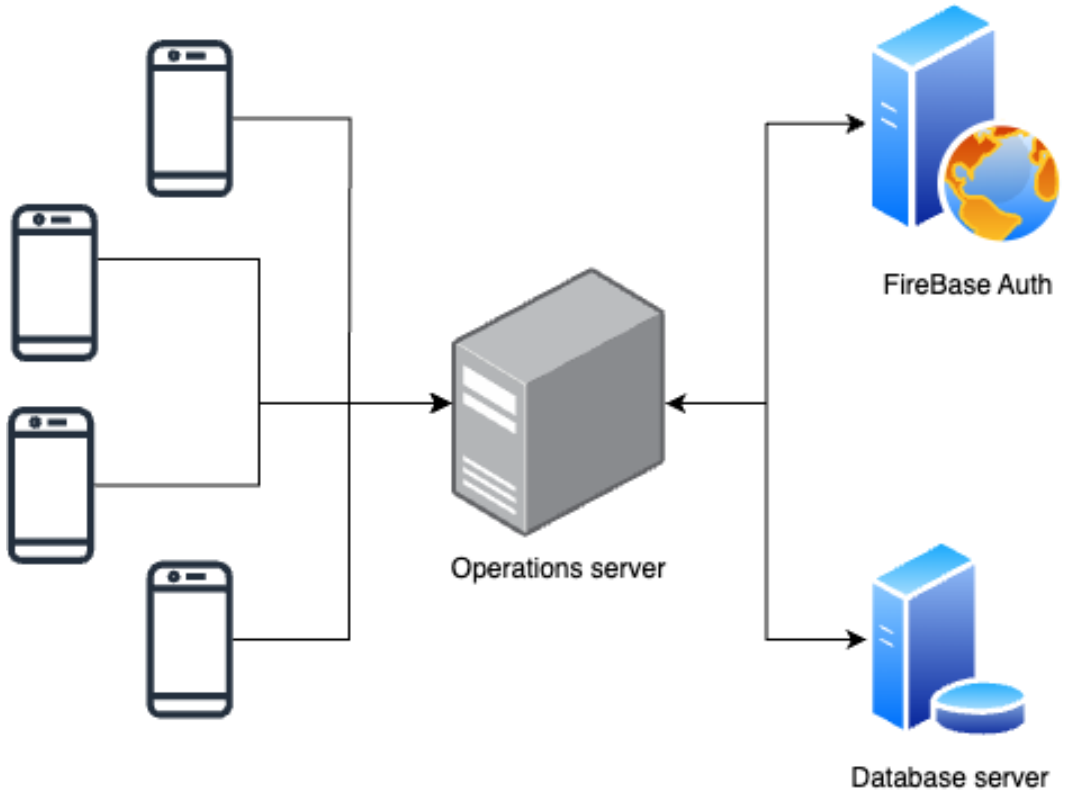
- **User registration:** Users can sign up for the iOS app by providing their relevant details, such as name, email, and password, to create an account and access the all app's features.
- **Search for books:** Users can browse and search for available books, utilising filters like genre, author, or location to find books of interest.
- **Book lending:** Users can select a book they own from their profile and lend it to other registered users, facilitating the sharing and circulation of books.
- **Book return:** Once a book has been borrowed, users can mark it as returned in the app, indicating that the book is now available for others to borrow.
- **Review of the book:** Users can share their thoughts and opinions about the books they have read by providing reviews and ratings, helping others in the community make informed decisions about their reading choices.
- **User Profile:** Each user has a profile that displays their personal information, lending history, borrowed books, and reviews, creating a personalised space for them to manage their activities and interactions within the app.

Workflow


View books and their detailed info
Search book by filter
See the book landing history
See current status of book
Add to favourite
Actor 1
Main Actions
Desicion to take/return a book
Is User authoriized?
Yes
No
Contact with current/prev holder via messanger
Sign up
Actor 2
Agree a meeting details or get adreess to send book by post or coirier
Accept the book rent/return

Tools and technologies

Deployment Diagram



Conclusion. Proposed project tasks

- Identify the functional and non-functional requirements ✅
- Explore the potential of blockchain technology for creating a secure and transparent platform ✅
- Investigate the best blockchain platforms and programming languages for developing ✅
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- Address the security and privacy concerns ✅
- Compare existing applications in terms of security, transparency, and ease of use. ✅

Conclusion. Results of non-functional requirements

- **Security**. To ensure the security of user data used the combination of **SHA-256** and **AES-256**
- **Scalability.** Carried out load testing. The application withstood the load of **10,000** users at the same time. And the database withstood a simultaneous load of **100,000** requests
- **Performance**. The average response time for book searches was reduced to less than **500 milliseconds**, ensuring swift retrieval of information even in scenarios with high user demand.
- **User Interface.** The intuitive design elements resulted in reduced learning curves for new users, enabling them to quickly adapt and utilise the application's features.

Future plans

- **Development** of a recommender system for the selection of personalized books based on the user's preferences, as well as his actions within the application.
- **Adding** the ability to moderate books. Namely, add the ability to check books for prohibited sources, authors, etc.
- **Service development.** Adding new functionality and developing an application for Android.
- **Reuse** of the developed technology in other areas.

Thanks for your attention