

Analysis of the Application of Blockchain Technologies by Building a Decentralized Social Media Application

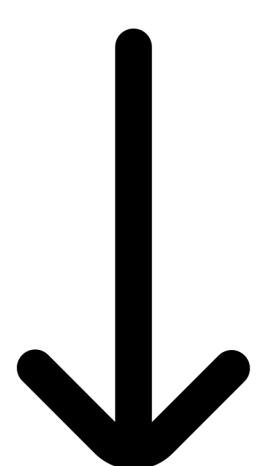
Aleksandr Molchagin, advised by Dr. Sandino Vargas-Perez

INTRODUCTION

Blockchain is an innovative data structure frequently used in the finance field to store important data such as transaction history. Blockchain is the underlying technology that enables decentralized payment systems, the most well-known of which are Bitcoin and Ethereum. It is designed to store data in a decentralized way: all information is distributed among network participants all over the world, removing central authority over the system. Such an approach helps to make the data immutable since transactions cannot be undone, while the vulnerability is very unlikely - a cyber attack on a single or even multiple nodes cannot affect the entire network. Even though blockchain is one of the most secure and reliable ways to store data, it is rarely used outside the banking industry, which raises a lot of questions about the technological capacity of blockchain. To analyze its potential, we build a social media mobile application to share thoughts anonymously using Ethereum, one of the biggest decentralized open-source blockchain systems, as its main data source. We discuss the difficulties a developer may face, as well as identify the advantages and disadvantages of using blockchain in modern software development.

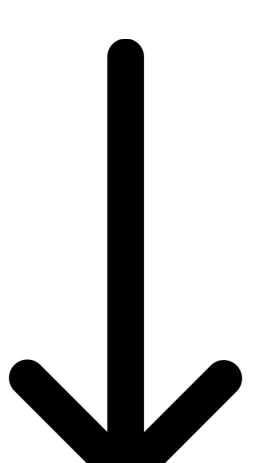
METHODS

Explore Technologies



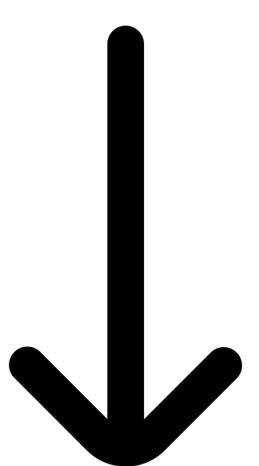
- Explore & learn blockchain technologies
- Evaluate possible application of blockchain
- Design decentralized application

Build Application



- Build backend using Ethereum & Solidity
- Build native Android application using Java
- Build native iOS application using SwiftUI

Test on-campus & Analyze



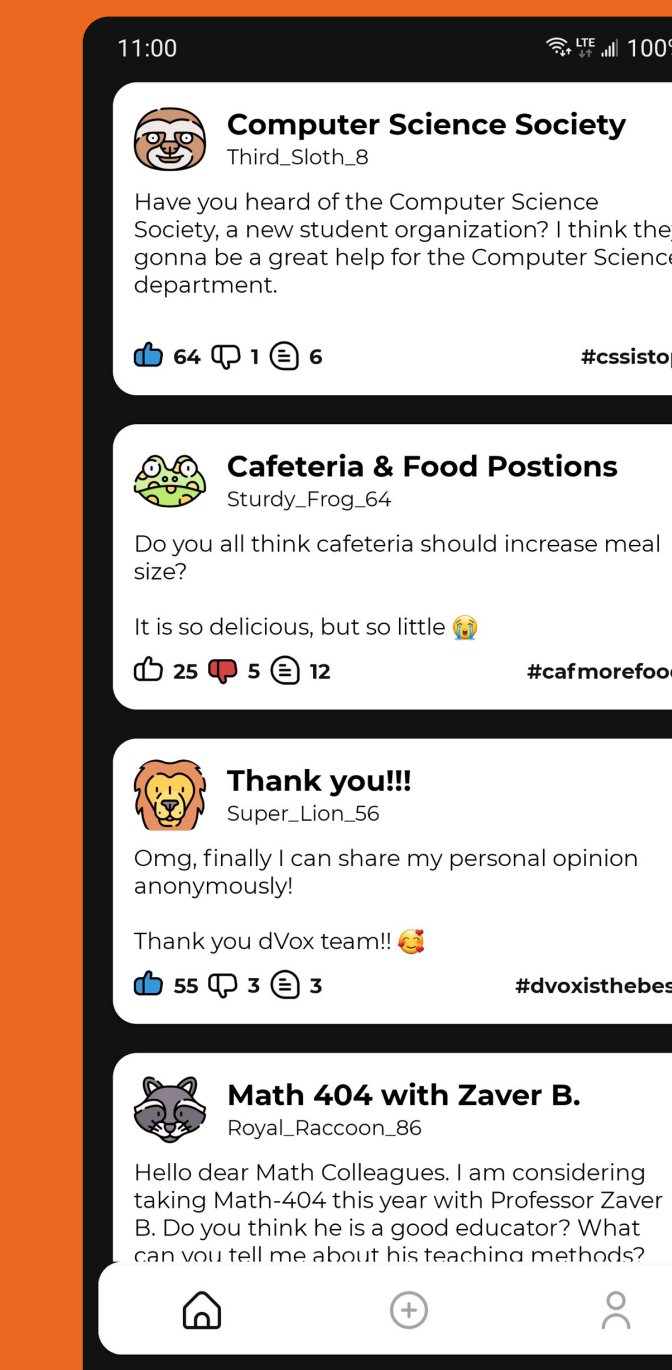
- Launch the application on-campus
- Analyze blockchain's performance
- Examine the limitations of blockchain

RESULTS & DISCUSSION

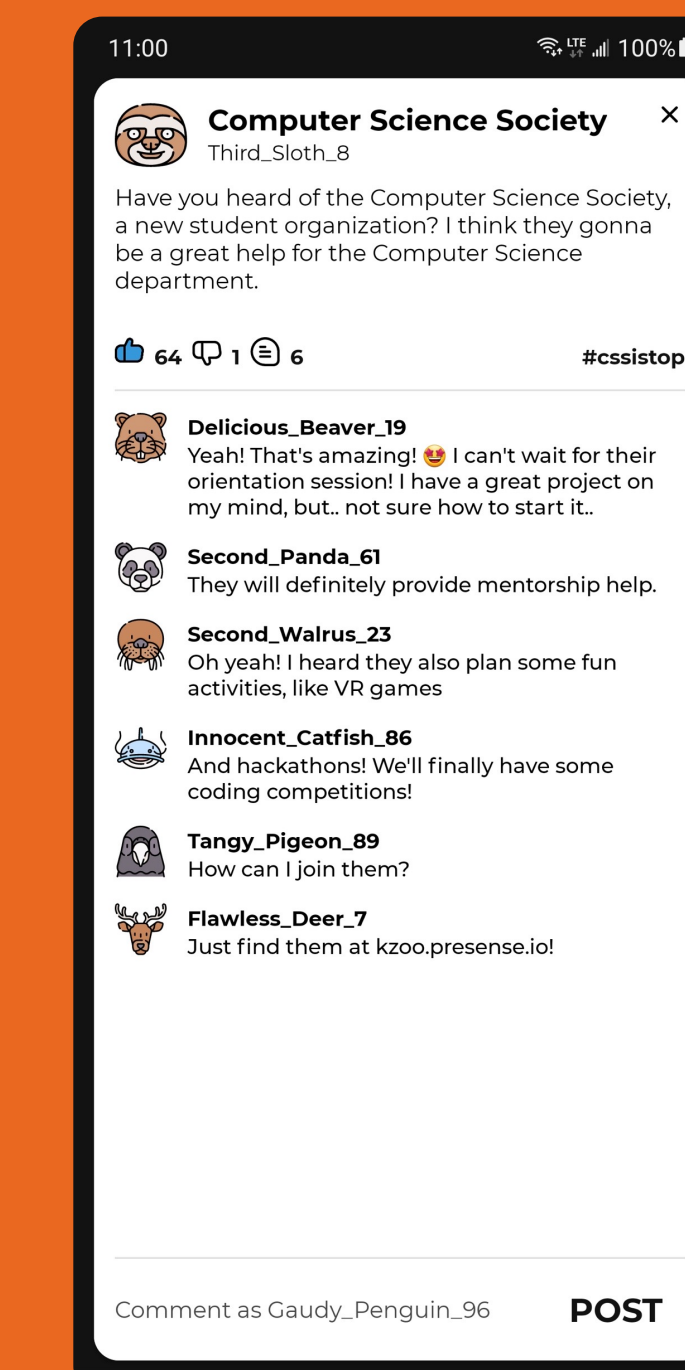
After exploring different possibilities of how to apply blockchain in software development, we decided to work on a decentralized social media application that allows students on-campus to share thoughts and ideas anonymously, which we lately call dVox. The priority of such an application is privacy and security - we want to be confident that users can share their ideas without concerns about their identities leaking. We successfully built a backend, a native Android, and a native iOS application. The backend consists of two parts:

- Decentralized storage (Ethereum network) - store all the posts & comments
- Centralized storage (Google Firebase) - enable login system, store APIs, usernames' list, posts' upvotes & downvotes (likes & dislikes)

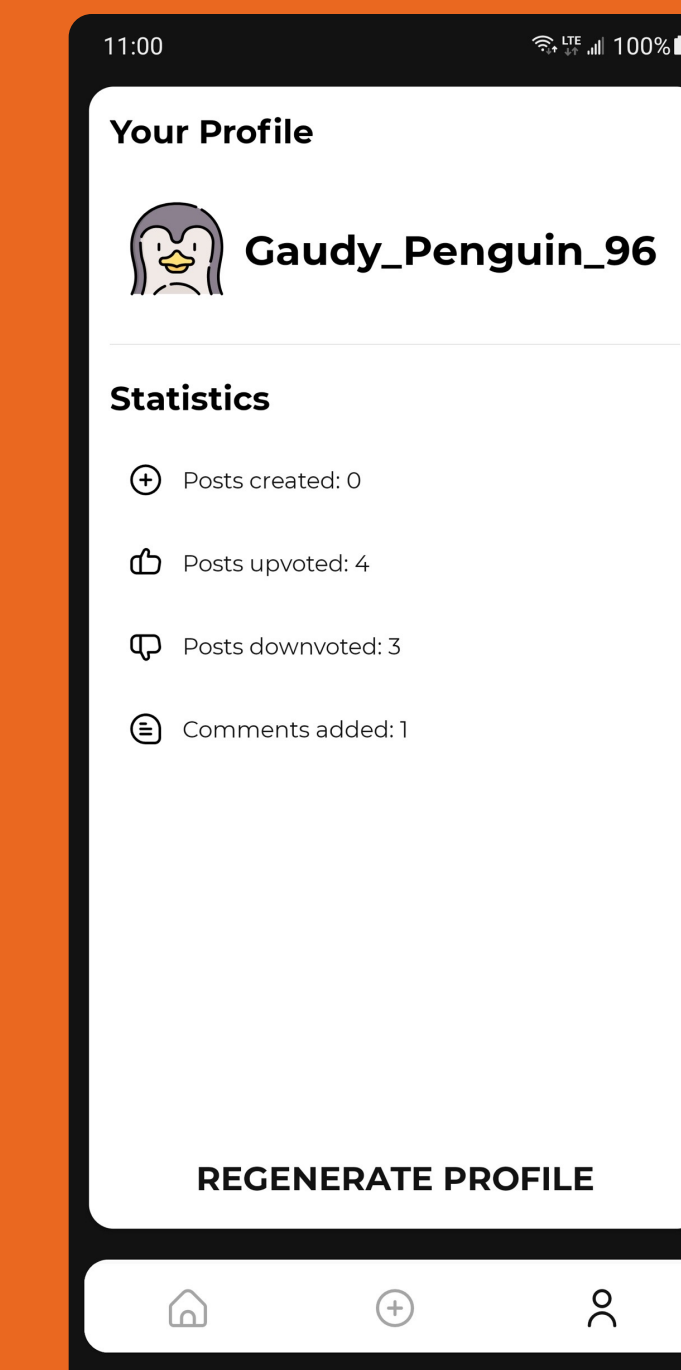
Some information is stored at the centralized storage to compare the performance of blockchain to a single server. As expected, blockchain is significantly slower in both read and write operations. It takes up to 2 seconds to read 15 posts in a row, and up to 10 seconds to create a new post. If we use a single server, both operations can be executed in less than 1 second. The tests were conducted on Ethereum Test Network Rinkeby, which is a developer version of Ethereum that allows testing decentralized applications without spending real money on transactions. Nevertheless, all transactions (in this case, creating new posts & comments) should be covered with the test version of ETH (Ethereum cryptocurrency). If we launched the application on the Ethereum Main Network, we would spend 0.2107 ETH (\$1010.95) just to test the application and maintain 37 users.



Screenshot 1. Feed of posts



Screenshot 2. Comments



Screenshot 3. User's profile

CONCLUSIONS

Blockchain can be applied to projects outside the financial field, especially if the project's data is sensitive and its immutability is important. Nevertheless, modern open-source blockchain systems have limitations. First, they are significantly slower compared to the central server systems. Second, if the developer pays for all users' transactions, it is expensive to scale a decentralized application.

- Backend:

<https://github.com/Decentralized-People/dVox-backend>

- iOS version:

<https://github.com/Decentralized-People/dVox-ios>

- Android version:

<https://github.com/Decentralized-People/dVox-android>



ACKNOWLEDGMENTS

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