Decentralized Social Network on Ethereum Blockchain

GAUTAM
Department of Information Technology
Maharaja Agrasen Institute of Technology,
Rohini, Delhi, India

Abstract -
Social networking has connected the world in unprecedented ways. It has turned the planet into a global street where we can interact and communicate with one another seamlessly. The internet world we see today would not have been possible without it. Social networks are one of the core facilitators in the technological progress of our society. But the current social networks have a central dependency. They are centralized to the core and thus have major disadvantages like single point of failure, power and authority for planning and decision making rest with top management organized around a hierarchical structure, dictatorial, prone to censorship & inflexible. Decentralized/Distributed social networking is the need of the hour as it is censorship resistant, gives anonymity, no single point of failure and power to the masses. It is resilient, inherently democratic and efficient.

Decentralized Social Networks are decentralized platforms that provide the usual services similar to centralized social networks like account creation and login, creating posts and supporting post creators through varied means. They provide a platform for people all around the world to connect and interact with one another. But it essentially cuts out all of the centralization that traditional social networks like Facebook, Twitter use. There is no centralization whatsoever. The services needed in a centralized social network to function properly are replaced in a decentralized social networking ecosystem by smart contracts and p2p, peer-to-peer, services. Since all issues can be solved online, most of the network will be online. To support the content creators, rewards and tips are provided in the form of cryptocurrencies. Also, post creation and update require minimal fees which are paid to the deployer as rewards for running and maintaining the network.

In this project, I have created the backend using smart contracts on the Ethereum blockchain. For the frontend, I used the React library. The project covers basic operations - creating user accounts and logging into the network using Web3 Ethereum wallets, creating posts, reading other people's posts, upvoting posts by sending tips to support content creators, providing newsfeed which contains all the posts on the social network. I used Solidity programming language to write the smart contracts and wrote tests in Javascript. To deploy and test the project, I used Truffle,Metamask and Ganache. It gives a basic idea of how Decentralized Social Networks work in a real-time environment

Key Words: Blockchain, Ethereum, Decentralized Social Network, Crypto Social Network, Dapp, Smart Contract.

1.INTRODUCTION

Need of the Study

The traditional social networks have central dependency and major disadvantages like single point of failure, power and authority for planning and decision making rest with top management organized around a hierarchical structure, dictatorial,prone to censorship & inflexible. Decentralized/Distributed social networking is the need of the hour as it gives anonymity, no single point of failure, power to the masses. It is resilient, censorship resistant, inherently democratic and efficient.

Scope of the Study

Ethereum is an open-source, decentralized blockchain featuring smart contract functionality. The native cryptocurrency token of the Ethereum platform is Ether (ETH). It is the second-largest cryptocurrency by market capitalization. Our goal is to use Solidity Smart Contract for Ethereum Blockchain and develop a simple social network with all the necessary functionalities. This project will serve as a basis for understanding how decentralized social networks can provide authentic democratic platforms to the people. Later on, advanced features
(eg:- functionality of adding comments/replies and audio/video) can be added and a full-fledged decentralized social network can be generated from this project.

Objective of the Study

Demonstrate a working decentralized social network through this project, scoped down to cover basic

operations - creating user accounts and logging into the network using Web3 Ethereum wallets, creating posts, reading other people's posts, upvoting posts by sending tips to support content creators, providing newsfeed which contains all the posts on the social network.

Methodology

Blockchains provide a way to establish trust in decentralized trustless networks. Ethereum is a blockchain which supports a Turing complete programming language to develop smart contracts. I have used Solidity to write smart contracts on Ethereum for deploying a decentralized social network. The tests are written in Javascript and for the frontend, I have used React and Bootstrap. I have also used Ganache (personal blockchain), Truffle (development suite) and Metamask (Ethereum Web3 Wallet).

TERMINOLOGY

Blockchain

A blockchain can be explained as a public database that is updated and shared across many computers in a network. "Block" means that data and state is stored in sequential batches or "blocks". "Chain" implies that each block cryptographically references its parent. A block's data can't be altered without altering all subsequent blocks, which would require the consensus of the entire network. Each new block and the chain must be agreed upon as a whole by every node in the network. This is so everyone has the same data. For it to work, blockchains need a consensus mechanism. Proof-of-Work and Proof-of-Stake are the two widely used consensus algorithms.

Ethereum

Ethereum is an open-source, decentralized blockchain containing smart contract functionality. Ether (ETH) is the native cryptocurrency token of the Ethereum decentralized platform. Ethereum is the second-largest cryptocurrency in the world. It is the most popular blockchain platform in the world. It was proposed in late 2013 by a cryptocurrency researcher and programmer named Vitalik Buterin. The development of Ethereum was funded by a crowdsale that took place between July and August 2014. The system went live on 30 July 2015. Ethereum Virtual Machine (EVM) is a decentralized replicated virtual machine, which can execute Turing-complete scripts and run decentralized applications. Ethereum has been utilized for many initial coin offerings (ICOs) and is also used in decentralized finance. It is currently being actively developed and is planning to implement a series of upgrades called Ethereum 2.0 with specifications including a proposed transition to Proof-of-Stake consensus mechanism and an increase in transaction throughput using sharding technology.

Dapps

Conventionally, participants don't write new code every time they want to request a computation on the Ethereum Virtual Machine (EVM). Rather, application developers upload reusable snippets of code, also called programs, into EVM storage, and then users make requests for the execution of these code snippets with assorted parameters. The programs uploaded to and executed by the network are called smart contracts or decentralized apps (Dapps). Thus, any developer can create a dapp and make it public to the network, using the blockchain as its data layer, for a fee paid to the network. Any user can then call the dapp to execute its code, again for a fee paid to the network.

Smart Contracts

A smart contract is a transaction protocol or a computer program which is intended to automatically execute, control or document legally relevant events and actions according to the terms of a contract or an agreement. Using smart contracts, developers can build and deploy arbitrarily complex user-facing apps and services: marketplaces, games, financial services, etc.

Objective of the Study

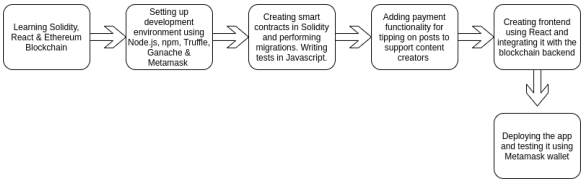
Demonstrate a working decentralized social network through this project, scoped down to cover basic operations - creating user accounts and logging into the network using Web3 Ethereum wallets, creating posts, reading other people's posts, upvoting posts by sending tips to support content creators, providing newsfeed which contains all the posts on the social network.

IMPLEMENTATION

For this project, I used Truffle (development suite), Ganache (personal development blockchain), Metamask (Ethereum Web3 Wallet), VSCodium. I created smart

contracts in Solidity on Ethereum blockchain. Together, the smart contracts work as a basic decentralized social network. It allows basic operations like creating user accounts and logging into the network using Web3 Ethereum wallets, creating posts, reading other people's posts, upvoting posts by sending tips to support content creators, providing newsfeed which contains all the posts on the social network.
The first smart contract was named "SocialNetwork.sol" & the other was named "Migrations.sol".

Tests and deployment code were written in Javascript. Tests can also be written in Solidity. The frontend code was written in React. For logging in the web app, we have to select Metamask wallet and reload the web app. It will integrate Metamask Ethereum wallet with the web app and we will see wallet's unique public address and identicon in the top right-hand corner of the web page. It implies that we have successfully logged in.



EXPERIMENTAL RESULTS

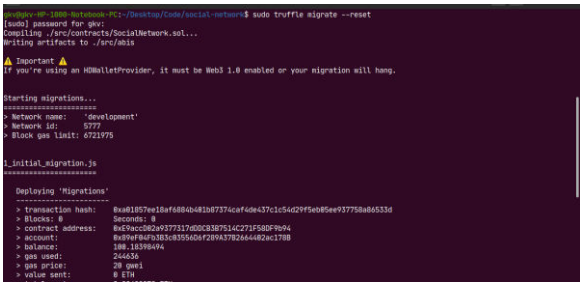


Fig 1: Deploying smart contract

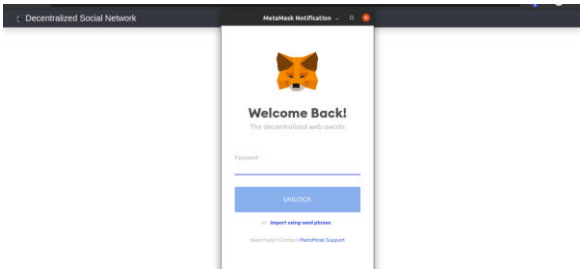


Fig 2: Connecting Decentralized Social Network with Metamask

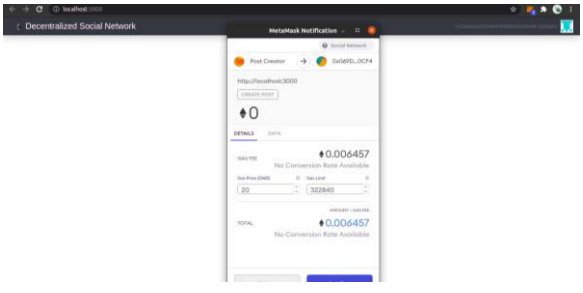


Fig 3: Creating a post

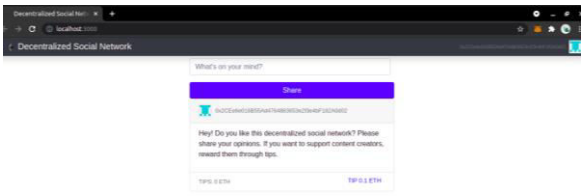


Fig 4: Confirmed transaction and post created

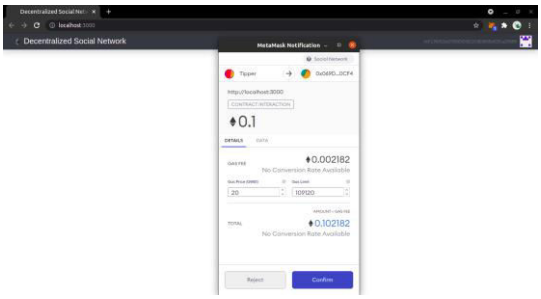


Fig 5: Rewarding post through tip

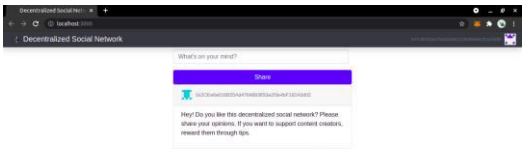


Fig 6: Posts feed update

CONCLUSIONS & FUTURE SCOPE

By working on this project, I learned a lot about Blockchain, Ethereum and how it works. Also, I gained valuable experience in integrating Ethereum blockchain with real-world applications. I learned a lot about writing smart contracts, performing cryptocurrency transactions, Solidity programming language and React.

This project serves as a basis for understanding decentralized social networks. It covers all the basic social network operations - creating new accounts, logging into the network, creating posts, supporting content creators through tipping posts, providing sorted newsfeed. Later on, advanced features (eg:- functionality of adding comments/replies and audio/video posts) can be added and a full-fledged decentralized social network can be generated from this project.

The benefits of decentralized social networking that we saw through this project were no single point of failure, swift post creation and transactional processing, no tracking, smooth currency transfer, impeccable security, financial freedom, 99.99% uptime, censorship resistant, no central authority and truly democratic. Every transaction recorded on the blockchain can't be practically altered. So, it removes the risk of hacks and frauds. Everything is open and the power is in the hands of the people.

It is expected that in the next 5 years, the world will gradually switch over to a decentralized world. Such a world will be truly democratic, where the public will have freedom from authoritarianism. The people will no longer be the puppets of selfish institutions & crony capitalists. The people will run and manage these platforms without any fear of being tracked.

REFERENCES

[1]: Hrishikesh Bawane, Tanuja Shinde, Abhishek Kadam, Yash Budukh, Prof. Pooja Mundhe, "Ethegram - An Ethereum and IPFS-based Decentralized Social Network System", International Research Journal of Engineering and Technology (IRJET), Volume: 07 Issue: 04 | Apr 2020, e-ISSN: 2395-0056, p-ISSN: 2395-0072

[2]: Social Networks Are the Next Big Decentralization Opportunity

[3]: https://ethereum.org/en/whitepaper/

[4]: What You Need to Know About Decentralized Social Networks

[5]: https://blockgeeks.com/guides/dapps