Decentralized Social Networking Platform:

Exploring The Potential of Blockchain in Social Media

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Abstract

Blockchain integration into social media platforms is referred to as social media utilising blockchain. Through this integration, users may interact, share content, and transact on a decentralised and secure network.

Users of social media may benefit from increased privacy, control over their data and assets, and a lack of middlemen. As a result, the system becomes more open and equitable, which lessens the influence of centralised organisations and improves the user experience as a whole. The use of public block chains and related tools has been included in the creation of a decentralised social media network. These tools—Ganache, MetaMask, Hardhat, and Ethereum IDE—have made it easier to deploy the contracts necessary for the platform's operation.

The proposed framework's storage of file metadata on the blockchain, which ensures transparency and dependability, is one of its main components. Peer-to-peer networks like the Mumbai Polygon Testnet have also been used to conduct commerce. With the use of decentralised storage, distributed processing, and effective lookup tools, this strategy intends to give users access to a social media platform that is more dependable and safe. Blockchain technology's incorporation with social media has the ability to revolutionise the sector and present consumers with brand-new, exciting options.

Keywords: Social media, blockchain, integration, decentralized, secure, transactions, privacy, contracts, peer-to-peer networks, etc.

I. Introduction

This implementation paper presents the details of the "Decentralized Social Media" project, a full-stack website built on blockchain technology. The project objective is to create a decentralized social media platform that helps users with greater control over their data, privacy, and content. This paper will provide a comprehensive overview of the implementation process, including the challenges faced and solutions implemented during development.

The architecture of the Decentralized Social Media platform, designed to be modular, scalable, and secure, is also presented. This paper then provides a detailed description of the technologies used in the development process, including blockchain, smart contracts, Hardhat, and other web technologies. This implementation paper gives a comprehensive overview of the "Decentralized Social Media" project, highlighting the technical and design decisions made during development, the challenges faced and solutions implemented, and the evaluation of the final product's performance and user experience.

II. Design and Architecture

5.1 ARCHITECTURE

The architecture of the decentralized social media project involves several layers and components, each serving a specific purpose. At the front-end layer, the project uses Next.js and Tailwind CSS, which allow developers to build responsive, fast, and scalable web applications. Next.js provides server-side rendering, static site generation, and other features that enhance the user experience. Tailwind CSS, on the other hand, offers a utility-first approach to styling, making it easy to create custom UI components. This framework provides a set of pre-defined classes for styling elements, making it easier for developers to create responsive and visually appealing user interfaces.

The back-end layer of the project is built on top of the Mumbai Polygon blockchain. The blockchain is used to store posts, comments, and user data in a decentralized manner. Solidity is used to write smart contracts, which define the business logic of the application. The Hardhat framework is used for testing and deploying smart contracts, and Ganache provides a local development blockchain for testing purposes.

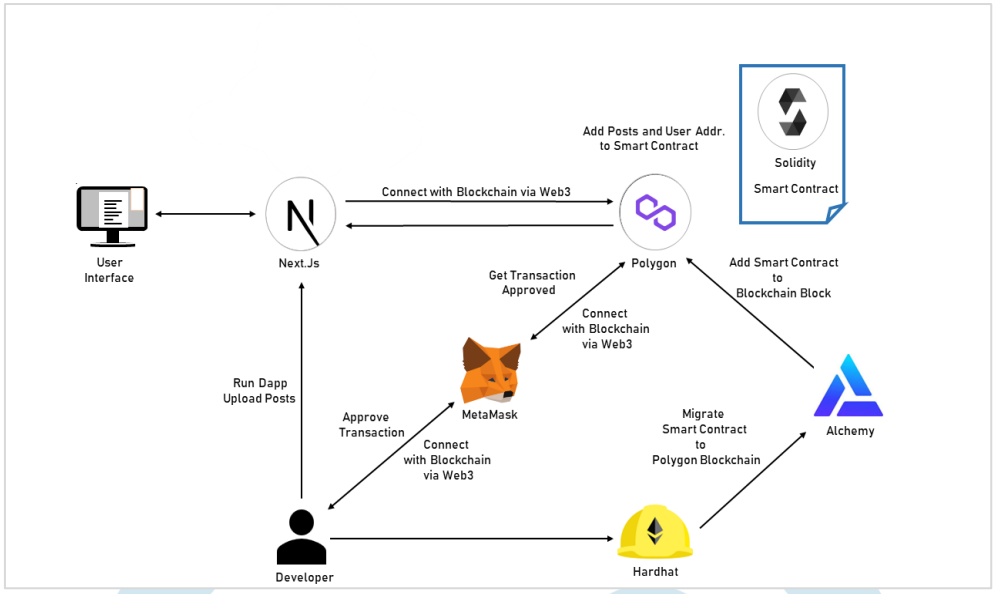

Fig. 1 System Architecture

In addition, the project utilizes MetaMask, a browser extension that allows users to interact with the Mumbai Polygon blockchain from their web browser. Alchemy is used as a node provider, which allows the application to communicate with the Mumbai Polygon blockchain.

Overall, the architecture of the project follows a decentralized design, where user data is stored on a blockchain and controlled by smart contracts. This architecture provides a higher level of security and transparency, as it eliminates the need for a centralized authority to control the social media platform. Additionally, the use of powerful tools such as Next.js, Tailwind CSS, Solidity, Hardhat, MetaMask, Ganache, and Alchemy ensures that the application is user-friendly, scalable, and easy to maintain.

EVALUATIONS

The evaluation of this decentralized social media application can be done in three major steps which are described individually. The first major step is the login process. A user can log in to the application using MetaMask, a digital wallet that enables users to interact with the blockchain. The login process is essential for accessing the application's functionalities such as posting, deleting, and tipping.

The second major step is the posting and deleting process. Users can create a post by adding text, and the post is stored and retrieved from the blockchain. The user can also delete their post, and the changes are reflected in the blockchain. The transaction of posting and deleting requires gas fees, and the confirmation is done using MetaMask.

The third major step is the tipping process. Users can tip other users' posts using cryptocurrency. The transaction of tipping also requires gas fees, and the confirmation is done using MetaMask.

The overall performance of the application depends on the blockchain's speed and the user's internet connection. The application should be able to handle many users and transactions without any delay or failure. The user interface should be user-friendly, and the user should be able to access all functionalities easily.

5.3 RESULTS

Figure 9. represents the page where the application is trying to connect with MetaMask. It can connect only with Polygon Mumbai.

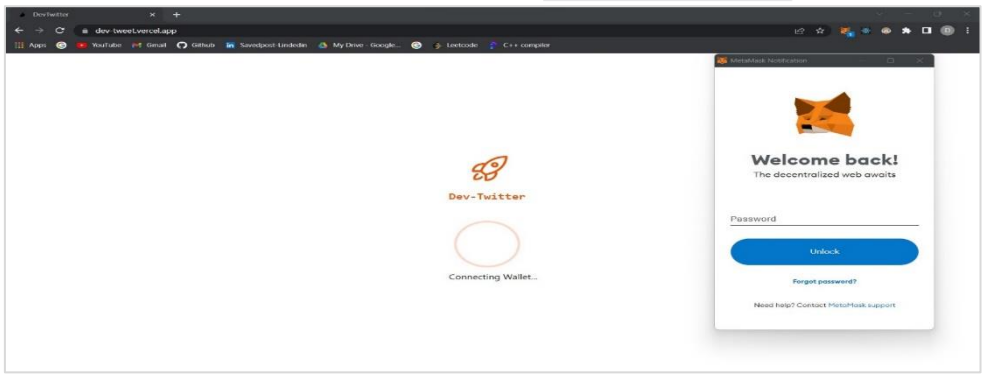

Fig.2 Sign In page

Figure 10. represents the page when the user login into the MetaMask and the application automatically connects with the MetaMask

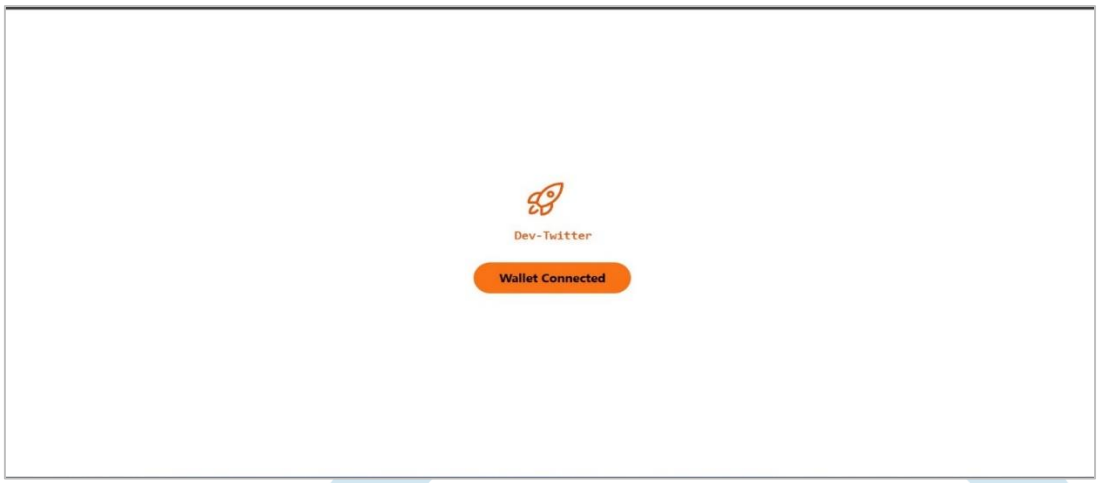

Fig.3 Connected Page

Figure 11. represents the Home page of the application. Users can write the post and it is visible when the 'Tweet' button is clicked.

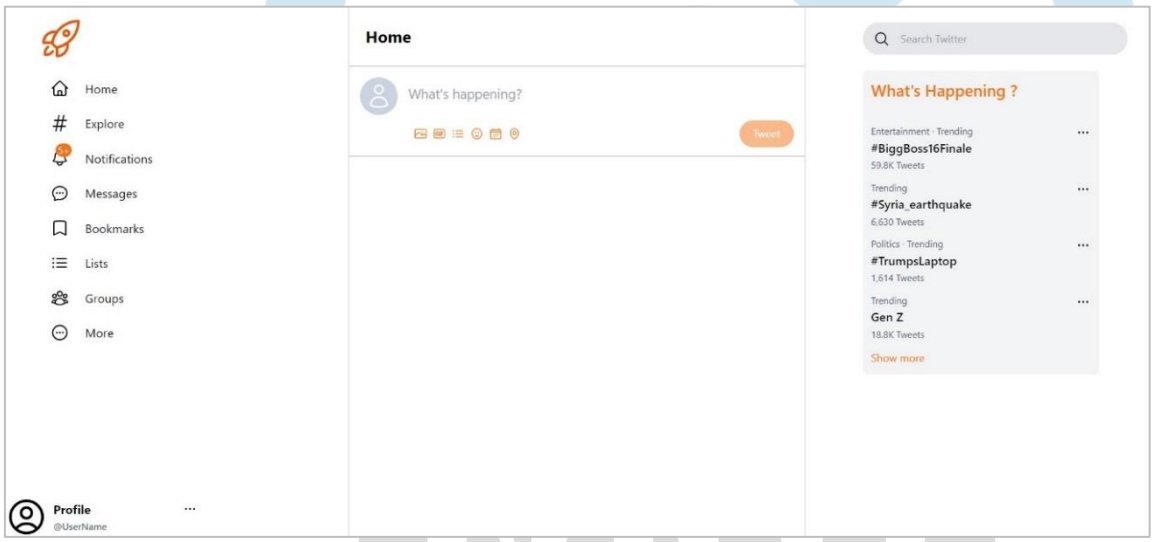

Fig.4 Home Page

Figure 12. represents the MetaMask prompt which confirms the function or transaction by deducting some Gas Fees.

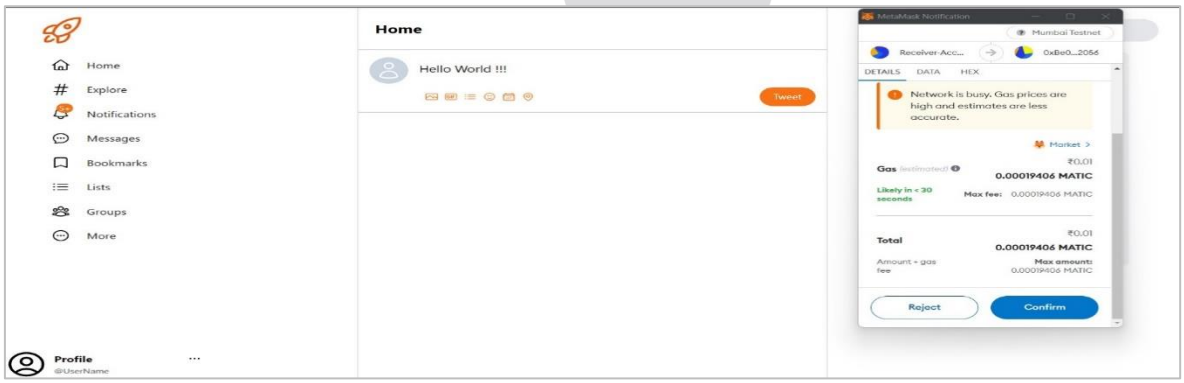

Fig.5 Post Confirmation

Figure 13. represents the posts that are retrieved from the blockchain and the notification of MetaMask about confirmation.

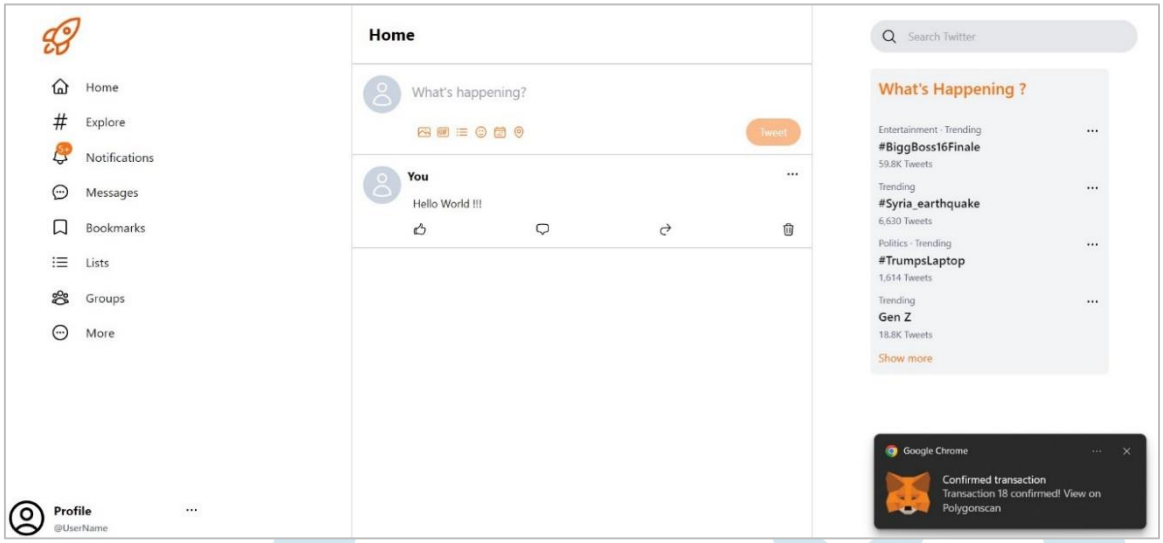

Fig.6 Post Retrieved

Figure 14. represents the Feeds or Home page where all the posts are visible.

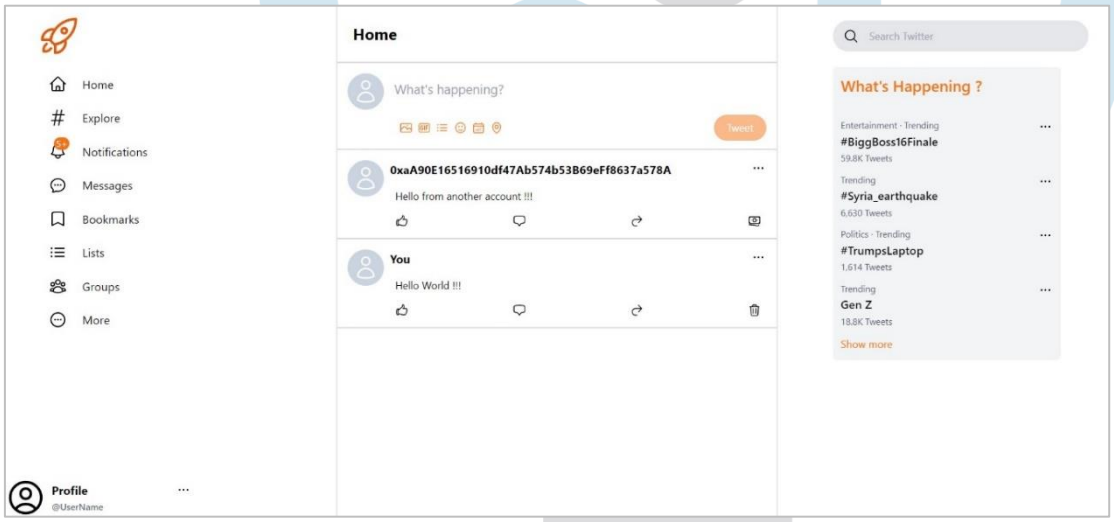

Fig.7 Other Tweets

Figure 15. represents the MetaMask prompt which confirms the function or transaction of deleting the post by deducting some Gas Fees.

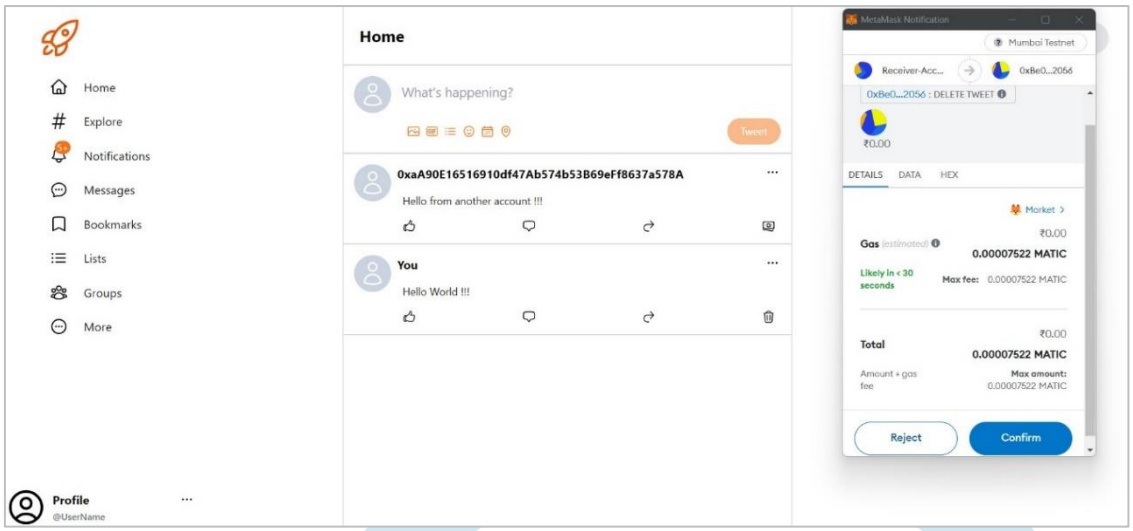

Fig.8 Deleting Post

Figure 16. represents the profile page of a user where only personal posts are visible.

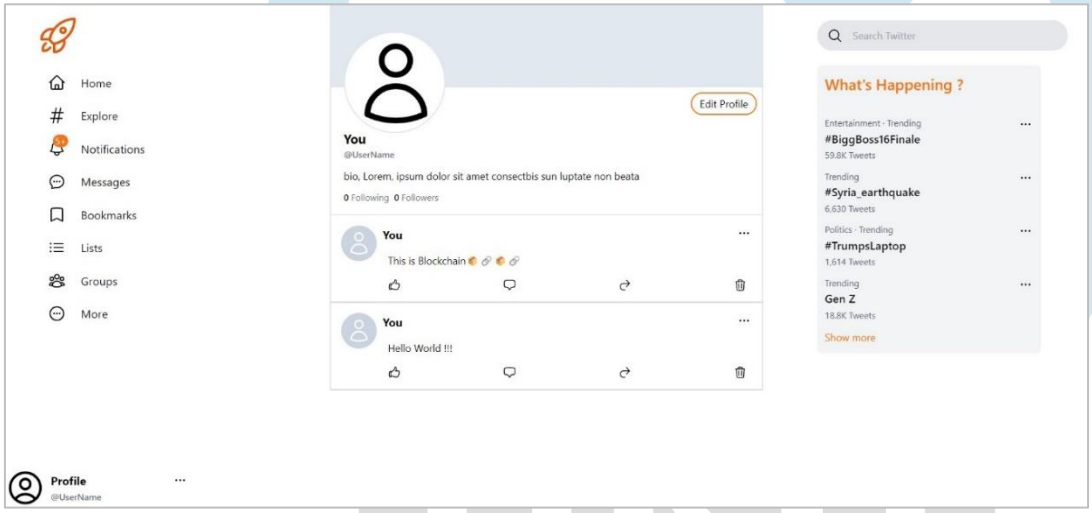

Fig.9 Profile Page

III. Technical Implementation

To enable secure transactions on the blockchain, the application uses MetaMask, which is a browser extension that allows users to interact with the blockchain and sign transactions securely. The posts and other data in the application are stored and retrieved from the blockchain using Solidity for Smart Contract development. Hardhat, which is a development environment for building and testing Ethereum applications, is used to compile and deploy the smart contract code. Ganache, which is a personal blockchain for Ethereum development, is used to test and debug the smart contract code in a local environment. Alchemy provides a gateway to the Mumbai Polygon Blockchain, which is a sidechain of the Ethereum network.

When a user accesses the application, they are prompted to log in using MetaMask. Once the user logs in, they are authenticated and authorized to perform actions on the blockchain.

After logging in, the user can post text on the application. When a user clicks the submit button, MetaMask is prompted which asks to confirm the transaction or function by deducting some Gas fees. The amount of gas required depends on the complexity of the transaction or smart contract, as well as the current network traffic and the gas price set by the user. Gas prices are typically denominated in Gwei, which is a fraction of one Ethereum, and can vary depending on market conditions and the user's desired transaction speed. In general, higher gas prices result in faster confirmation times, while lower gas prices may result in longer confirmation times or even failed transactions if the network is congested. The text is then stored on the blockchain using the smart contract code developed using Solidity.

The user can also delete their post from the application. When the user clicks the delete button, the application sends a transaction to the smart contract to remove the post from the blockchain. The user can also tip other users' posts. When the user clicks the tip button, a transaction is sent to the smart contract to transfer the specified amount of tokens to the user who posted the content. Every

transaction on the blockchain requires gas fees to be paid by the user. When a user performs an action, such as posting, deleting, or tipping, the application prompts the user to confirm the transaction and pay the required gas fees using MetaMask.
All the posts and other data in the application are stored on the blockchain in encrypted format using the smart contract code. When a user accesses the application, the posts are retrieved from the blockchain and displayed on the application.

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IV. Conclusion

Based on the information and analysis presented in this paper, the development of a decentralized social media platform using blockchain technology is a promising approach to addressing the issues of centralized control and data privacy that plague traditional social media platforms. The "Decentralized Social Media" project presented in this report is a successful implementation of this approach, providing a secure, user-centric, and transparent platform for users to share their ideas and interact with others without fear of censorship or data breaches. Looking forward, decentralized social media has the potential to be a transformative force in the world of social media and online communication. By empowering users with greater control over their data and content, decentralized social media platforms have the potential to promote free speech, protect user privacy, and create more open and transparent online communities.