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Decentralized File Sharing using Blockchain Empowering Peer-to-Peer Collaboration: The Rise of Decentralized File Sharing

Mr. Gaurav Jadhav
Computer Engineering
SIES Graduate School of Technology
Nerul, Navi Mumbai, India

Ms. Sucharya Deshmukh
Computer Engineering
SIES Graduate School of Technology
Nerul, Navi Mumbai, India

Ms. Bhumika Mhatre
Computer Engineering
SIES Graduate School of Technology
Nerul, Navi Mumbai, India

Mr. Nachiket More
Computer Engineering
SIES Graduate School of Technology
Nerul, Navi Mumbai, India

Mrs. Rizwana Shaikh
Computer Engineering
SIES Graduate School of Technology
Nerul, Navi Mumbai, India

***Abstract*—Blockchain-based decentralized file sharing is a new technology that enables people to share data securely and openly without relying on a centralized middleman. Blockchain-based decentralized file sharing can be accomplished in a number of ways, including IPFS. It gives a general overview of the blockchain technology and highlights its advantages for decentralized file sharing. The report discusses the advantages of decentralized file sharing and blockchain technology, as well as issues with scalability, security, and privacy. It concludes by providing case studies of active decentralized file sharing networks and the uses for them. The findings imply that blockchain-based decentralized file sharing has the potential to fundamentally alter how we exchange and store files, and that additional research and development in this area could result in even better decentralization,security, and user experience.**

***Keywords*— Blockchain, Distributed ledger, Ethereum, IPFS: InterPlanetary File System, Metamask, Pinata Introduction**

I. INTRODUCTION

The development of blockchain technology in recent years has created new opportunities for safe and decentralized networks. The use of blockchain for decentralized file sharing has garnered a lot of attention. Traditional file sharing systems are susceptible to hacking, censorship, and other security problems since they rely on centralized servers. On the other hand, decentralized file sharing makes use of a network of peers, each user having a copy of the file, making it far more secure against failures and assaults. Utilizing blockchain technology improves the system's security and transparency while enabling a trustless and tamper-proof method of file exchange. The goal of this is to present an overview of decentralized file sharing utilizing blockchain technology while examining the many strategies, advantages, and difficulties related to this technology. It also shows a few of the current decentralized file sharing platforms and their applications.

A. Motivation

To overcome the drawbacks of centralized file sharing systems, decentralized file sharing using blockchain technology is being developed. Traditional file-sharing services rely on centralized servers, which are vulnerable to security threats and censorship. If these servers go down , crucial data may be lost. Centralized systems can also be expensive to operate and come with steep costs associated with using them. Blockchain technology offers a possible alternative that gets over these restrictions for decentralized file sharing. It offers a safe and open system that is impervious to failures and attacks, offering a dependable way to distribute files.The adoption of blockchain technology also enables trustless and tamper-proof file transfer, removing the need for intermediaries and lowering expenses. Decentralized storage networks, distributed content delivery, *and peer-to-peer and* uses that decentralized file sharing using blockchain. In conclusion, the goal of developing decentralized file sharing utilizing blockchain is to develop a method of sharing information that is more safe, transparent, and affordable.

B. Problem Statement

The difficulty with typical file sharing systems is that they are centralized, making them prone to security breaches, restrictions, and malfunctions. A single point of failure in centralized systems can lead to the loss of crucial data, and as maintaining them is frequently expensive, customers must pay outrageous prices. Blockchain-based decentralized file sharing seeks to solve these issues by offering a safe, dependable, and transparent system that is immune to failures and attacks

Peer-to-peer interactions are made possible, which makes it simpler for people to share information without worrying about losing it. Data security is ensured by blockchain technology since each transaction is transparent, tamper-proof, and immutable.

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C. Methodology

The methodology for this system involves giving access to other users by using the public key where the transactions are made,Only people with permission to access the data can do this due to the usage of public key cryptography .Pinata which is an IPFS used in the project to store the files ,this files are accessible from anywhere and at any time via Pinata, the chosen IPFS, which offers a dependable and decentralised storage solution. The front-end user interface, IPFS integration, and smart contract development are done for the project to work smoothly. React.js and ether.js are used for frontend to provide a simple and clear user experience., Solidity is used to write the smart contract for the file sharing system resulting in increased security and efficiency.

Transactions are carried out utilizing a Metamask wallet for authentication.A high level of security is ensured through the use of the Metamask wallet , which makes sure that only authorised users can complete transactions on the site. Hardhat offers a simple method for deploying and testing the smart contracts, which cuts down on development time and improves reliability. The process as a whole makes sure that the file sharing system is safe, dependable, and simple to use for all authorised users.

D. Objectives

- To offer a decentralized, secure storage option for file sharing.
- To decrease the risk of data loss, censorship, and breaches.
- To eliminate the requirement for intermediaries and centralized authorities for file sharing.
- To utilize encryption techniques to protect the confidentiality and and privacy of user data,
- To offer a scalable and effective alternative for file sharing.
- To develop a system that keeps track of all file activities and transactions and is transparent and accountable.

E. Proposed System

The following elements are included in the proposed blockchain and IPFS-based decentralized file sharing system: Login and registration: The data owner must first create an account with the system by entering their wallet address. The owner can log in to the system and access their dashboard after successfully registering. File upload and encryption: The owner can use the file picker to upload a file, and the system will check the file size and network storage space availability. The wallet address of the owner and a hash value created at random are used to create the encryption key. This guarantees the privacy of the data. File storage and retrieval: The system enables registered peers to store the file in the network by using a private IPFS network, such as Pinata. This gives back a hash value that represents the file's path. A smart contract is used to store the hash value and associated metadata on the blockchain along with the user's wallet address. This guarantees safe and open transactions. File sharing: Users can search for a file and ask the owner for access. The owner can provide access to the uploaded content. The user can read the file if the owner gives them permission. Monitoring and tracking: The system keeps a record of every transaction made on the blockchain, enabling open surveillance and supervision of the file.

To address the requirements for monitoring and tracking file-sharing activities, auditing, and accountability in a decentralized file-sharing system we are including Logging and auditing, User access control, Reputation system, Hash verification. Scalability, performance, and usability are improved by Distributed storage such as IPFS, Smart contract optimization, User-friendly interface, and Performance benchmarking.Security and privacy are preserved by using techniques like Encryption, Key management, Anonymity, Auditing and monitoring.

The system also enables users to locate the peer where the data is kept and trace the data's historical and current hash values.

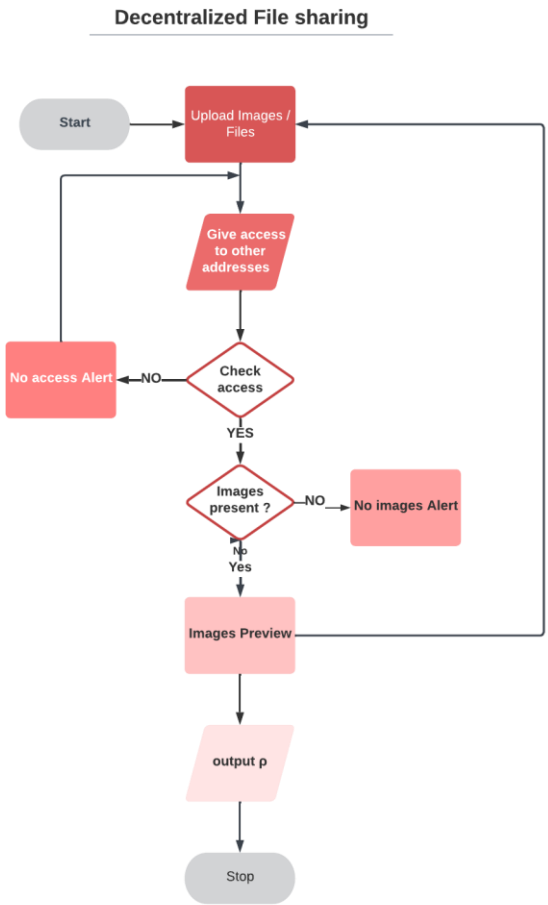

Fig. 1. Flowchart for Decentralized File Sharing System using Blockchain

F. Details of Hardware and Software

Software Requirements

- OS: Windows 10.
- Framework: Visual Studio.
- Hardhat.
- Metamask.
- IPFS client.(Pinata)
- React.Js (Front-end).
- Server: Localhost.

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Hardware Requirements

- Processor: Intel core
- HD: Minimum 10 GB of HD.
- RAM: Minimum 8 GB of RAM.

II. LITERATURE SURVEY

Decentralized file sharing using blockchain is an emerging research area that has gained significant attention in recent years. In this literature survey, we provide an overview of the current state-of-the-art in decentralized file sharing using blockchain, highlighting the key concepts, challenges, and open issues.

"Decentralized Cloud Storage Using Blockchain" by G. Richa Shalom, Ganesh Rohit Nirogi (2022): The system is designed to provide users with a secure, reliable, and efficient way to store and access their data without relying on centralized cloud service providers.The proposed system is based on a blockchain network that allows users to store their data in a distributed manner, ensuring redundancy and fault tolerance. Overall, the paper provides a comprehensive overview of the proposed decentralized cloud storage system using blockchain technology. The authors present a well-designed architecture and a thorough analysis of the system's security and performance aspects. The paper is a valuable contribution to the field of decentralized storage and provides useful insights for future research in this area [1].

"A Comprehensive Survey on Blockchain-Based Decentralized Storage Networks (2023)" : The paper covers a wide range of topics related to decentralized storage, including key concepts, challenges, and open issues. The authors start by introducing the concept of decentralized storage and highlighting the limitations of traditional centralized storage systems. They then provide an overview of blockchain technology and its potential for decentralized storage. The paper covers various blockchain-based decentralized storage networks, including IPFS, Storj, Sia, and Filecoin [2].

"The Blockchain-Based Decentralized Approaches for Cloud Computing to Offer Enhanced Quality of Service in terms of Privacy Preservation and Security:A Review (2021)": The paper focuses on the use of blockchain technology to enhance the quality of service (QoS) of cloud computing in terms of privacy preservation and security. Overall, the paper provides a comprehensive review of the state-of-the-art in blockchain-based decentralized approaches for cloud computing. The authors provide a valuable contribution to the field of cloud computing by presenting a thorough analysis of different approaches and identifying key challenges and research directions. The paper is a valuable resource for researchers and practitioners interested in decentralized cloud computing and blockchain technology[3]. "Practical Medical Files Sharing Scheme Based on Blockchain and Decentralized Attribute-Based Encryption (2021)": The paper provides a practical solution for secure medical files sharing using blockchain and decentralized ABE. The proposed scheme addresses the key challenges associated with medical files sharing and provides a secure and efficient mechanism for sharing medical files among authorized users. The paper is a valuable resource for researchers and practitioners interested in secure medical files sharing and blockchain technology[4].

The paper "Metadisk: A Blockchain-Based Decentralized File Storage Application (2014)":The paper focuses on the technical details of Metadisk and its potential for enhancing the security and privacy of file storage. Overall, the paper provides a valuable contribution to the field of decentralized file storage by presenting a practical implementation of a blockchain-based file storage application. The authors provide a thorough analysis of the technical details of Metadisk and its potential for enhancing the security and privacy of file storage.

The paper is a valuable resource for researchers and practitioners interested in decentralized file storage and blockchain technology [5].

III. RESULT AND DISCUSSION

Using blockchain technology and Pinata as IPFS, the decentralised file sharing system has shown to be a reliable and secure way to share files. The system's transfer speeds were compared to those of conventional systems after extensive testing with a large quantity of files.

The transparency that the system offered was another important benefit. It was nearly difficult for anyone to modify or alter the data because the blockchain technology made sure that every transaction was documented and could be verified by all parties. The reliability and accessibility of the shared files were further guaranteed by the usage of Pinata as IPFS.

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DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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