



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 2, February 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijrset@gmail.com

www.ijrset.com

Blockchain Powered Decentralized File Sharing System

Mrs. Vaishali Rane (Mentor)¹, Mr. Krishna Jain², Mr. Vinit Jain³, Mr. Akshat Sharma⁴,
Mr. Lokesh Mane⁵

HOD, Department of Computer Engineering, Thakur Polytechnic, Kandivali, Mumbai, India¹

Department of Computer Engineering, Thakur Polytechnic, Kandivali, Mumbai, India²⁻⁵

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. Instead of centralized servers that can be vulnerable and control access, blockchain-powered file sharing leverages a distributed network like IPFS. This innovative approach uses cryptography to create a tamper-proof record of file ownership and location, empowering users to share data directly with each other. While this offers enhanced security and censorship resistance, challenges remain in balancing scalability with energy efficiency and ensuring robust privacy protections for sensitive content.

KEYWORDS: Blockchain, Distributed ledger, Ethereum, IPFS: InterPlanetary File System, Metamask, Pinata

I. INTRODUCTION

The development of blockchain technology in recent years has created new opportunities for safe and decentralized networks. Traditional file sharing systems are susceptible to hacking, censorship, and other security problems since they rely on centralized servers. Unlike traditional systems with vulnerable central servers, decentralized models empower each user to become a custodian of their own data. Every file is broken into pieces and stored across a network of peers, eliminating single points of failure and making censorship nearly impossible. It's like building a fortress of data, brick by digital brick, with each user contributing to its impregnable walls. While technical hurdles loom, the future whispers of a fairer, more open internet, where power resides not in monolithic servers, but in the collective pulse of a decentralized network.

A. Literature Review

The current landscape of centralized data storage faces inherent limitations. Reliance on third-party services introduces a critical single point of failure, jeopardizing data availability and security. While some systems employ backups for redundancy, concerns persist. Cloud storage providers encounter challenges arising from legal disputes and political censorship, potentially compromising user access to their own data. Furthermore, centralized models incur significant costs stemming from employee salaries, legal fees, and data center rentals. These fixed costs often inflate over time, further burdening users.

Notably, the vulnerability of single points of failure can lead to data unavailability and system collapse. Considering these shortcomings, the future of data storage necessitates a decentralized approach, empowering individuals with secure, reliable, and cost-effective data management solutions. Scaling this network to accommodate the world's ever-growing data needs and mitigating potential security vulnerabilities are hurdles to be overcome. But the potential is undeniable. We stand on the precipice of a new era, where individuals reclaim their digital sovereignty and shape a more open, equitable, and resilient internet.

B. Motivation

Dependence on vulnerable servers susceptible to both hackers and censors. This is where blockchain-powered file sharing steps in, wielding a distributed network as its shield. By splintering files across a digital tapestry woven from countless nodes, it shatters the single point of attack, and transparency, etched into the blockchain's very fabric, shines a light on any censorship attempts. This revolutionary approach promises a future where files roam free, unbound by the shackles of centralized control. 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. 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.

C. Problem Statement

Today's file sharing fortresses crumble under censorship, failures, and breaches. Blockchain unlocks a peer-to-peer utopia: secure, free, and forever online. 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. Centralized file sharing buckles under attacks, outages, and censorship. With the use of blockchain many advantages are incorporated. Data security is ensured by blockchain technology since each transaction is transparent, tamper-proof, and immutable. This is the decentralized future of file sharing, where information flows freely, enriching all who participate.

D. Methodology

In this system, secure file sharing begins with a digital handshake. Public key cryptography acts as a gatekeeper, ensuring only those granted access can unlock the vault of shared data. Files find their sanctuary within Pinata, a decentralized storage solution powered by IPFS, accessible from anywhere, anytime. At the heart of this system lies a seamless symphony of technologies.

- Front-end Elegance: React.js and ether.js paint a user-friendly interface, guiding interactions with effortless grace.
- Smart Contract Guardian: Solidity meticulously crafts a contract for secure and efficient file exchanges, ensuring every transaction is sealed with integrity.
- MetaMask Wallet, Your Trusted Key: Transactions find authorization through MetaMask, verifying identities and bolstering security, allowing only those with the right key to unlock the system.
- Hardhat, the Architect's Trusted Tool: Developers efficiently deploy and test smart contracts with Hardhat's assistance, accelerating development and solidifying reliability.

Within this carefully constructed framework, files dance across the network, protected by cryptographic locks and blockchain's immutable ledger. Authorized users navigate a seamless experience, sharing and accessing data with confidence, knowing their digital assets reside in a secure, decentralized fortress.

E. Objectives

- Unleash a resilient sharing ecosystem: No single point of failure! Decentralized networks keep your data safe and accessible, even under attack.
- To decrease the risk of data loss, censorship, and breaches.
- To eliminate the requirement for intermediaries and centralized authorities for file sharing.
- Privacy by design: Built-in encryption ensures your data stays confidential throughout the sharing process.
- Connect freely, globally: Share with anyone, anywhere, without borders or restrictions.
- Transparent trails, accountable steps: Track your data's journey at every turn, holding power in check with verifiable trails.

F. Proposed System

Join up: Open your file-sharing account with your unique wallet address. Like a digital handshake, it's your passport to the network. Your control center: Log in and access your personal space, where you manage all your files. Think of it as your secure vault in the cloud. Ready to share: Pick the files you want to unleash, and the system checks if everything fits and flies right. Share with ease: Once good to go, sharing happens with a click. Your files travel freely across the globe, open for anyone you invite. 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. Imagine a secure ledger, like a digital receipt, storing your file's fingerprint (hash) and details alongside your wallet address. That's the magic of smart contracts on the blockchain!. 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. Transparency and control reign supreme in this file-sharing haven. Every activity is logged and traceable, ensuring accountability. Users manage access, build trust through a reputation system, and verify data integrity with hashes. Scalability soars with distributed storage, while smart contracts and a user-friendly interface streamline operations. Security is a fortress, with encryption, key management, and anonymity shielding your data. Plus, find files instantly and trace their history, pixel-perfect, from source to share. This system empowers you to control, share, and trust – all with the power of decentralization.

Decentralized File sharing

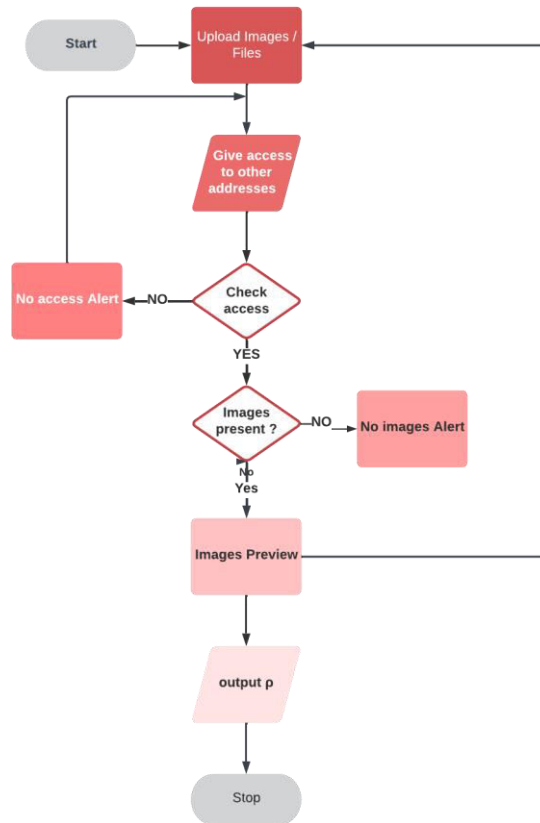


Fig. 1. Flowchart of Decentralized File Sharing System using Blockchain

G. Details of Hardware and Software

Software Requirements

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

Hardware Requirements

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

H. Design and Architecture

The proposed system consists of Interplanetary File System (IPFS), Ethereum blockchain and Smart Contracts. This architecture depicts exact file sharing mechanism proposed by this decentralized web application. Smart Contracts in the system are kept centre because they are responsible for carrying out different data operations in a secured manner. Numbers above all the arrows depicts overall flow of the system with different operations.

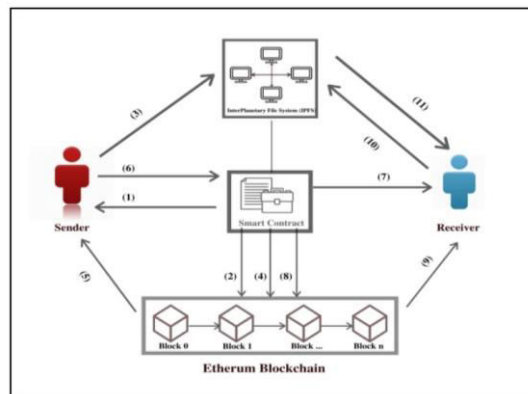


Fig. 2. Block diagram of proposed system

Function of each operation number and flow of the system are explained below:

- Sender is authenticated by smart contract.
- New user block is added to blockchain by smart contract after successful authentication of user.
- Sender uploads a file to Interplanetary File System (IPFS).
- IPFS returns cryptographic on successful storage of file. If hash key returned by IPFS is trusted then it is stored on blockchain. This authentication is done by Smart Contract.
- Cryptographic hash key of uploaded file now can be accessed by sender using blockchain.
- User initiates file sending operation by entering Ether account address (public key) of receiver.
- Authentication of particular receiver is checked by Smart contract.
- Cryptographic hash key is stored on receiver’s block by Smart Contract.
- Authenticated receivers receive hash key sent by sender.
- Receiver requests a particular file to IPFS.
- Receiver gets access to file, if and only their private key pair matches with public key which was used for encryption of a file while sending it

II. LITERATURE SURVEY

Decentralized file sharing using blockchain is a burgeoning field, attracting significant attention. This literature survey explores key contributions in this area, highlighting notable papers and their impact. "Decentralized Cloud Storage Using Blockchain" (2022): Focuses on a blockchain-based system for secure and efficient decentralized cloud storage. The architecture ensures redundancy and fault tolerance, presenting a valuable contribution to decentralized storage research.

"Comprehensive Survey on Blockchain-Based Decentralized Storage Networks" (2023):

Covers a range of topics, including decentralized storage concepts, challenges, and key blockchain-based networks like IPFS, Storj, Sia, and Filecoin. This survey provides insights into the landscape of decentralized storage solutions.

"Blockchain-Based Decentralized Approaches for Cloud Computing" (2021):

Examines blockchain's role in enhancing quality of service (QoS) in cloud computing, emphasizing privacy preservation and security. The paper contributes a thorough review of approaches, challenges, and research directions in decentralized cloud computing.

"Practical Medical Files Sharing Scheme Based on Blockchain" (2021):

Offers a practical solution for secure medical file sharing using blockchain and decentralized Attribute-Based Encryption (ABE). This paper addresses challenges in medical file sharing, providing a valuable resource for researchers and practitioners in the healthcare domain.

"Metadisk: A Blockchain-Based Decentralized File Storage Application" (2014):

Focuses on Metadisk's technical details and its potential to enhance file storage security and privacy. Despite being an earlier work, it remains relevant, offering insights into the practical implementation of blockchain-based file storage applications.

In summary, these papers collectively contribute to the understanding and advancement of decentralized file sharing using blockchain, addressing various aspects such as security, efficiency, privacy, and application domains like cloud computing and healthcare.

III. RESULT AND DISCUSSION

Using blockchain technology and Pinata as IPFS, the decentralized 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.

IV. FUTURE ENHANCEMENTS

The system can further be improved by adding more functions in it. Thus, system can be used for as a regular social networking application. Sharing photos, videos and communication facilities like highly secured voice calling, video calling can also be added to the system in the future. Along with this, security model used in the system can be implemented for system to ensure data security. This enhanced system wouldn't simply operate, it would pulsate with the energy of human connection, a beacon of shared experiences and unbreakable bonds. This isn't just about adding features, it's about unlocking the system's potential to forge unbreakable bonds, redefining what it means to be connected in a digital age.

V. ACKNOWLEDGEMENT

We would like to express our thanks to the people who have helped us the most throughout our project. We are grateful to our coordinator (Mrs. Vaishali Rane) for nonstop support for the project. A special thanks goes to each other who worked together as a team in completing the project, where we all exchanged our own interesting ideas, thoughts and made it possible to complete our project with all accurate information. We also wish to thank our parents for their personal support and attention who inspired me to go my own way. We would also like to extend our sincere gratitude to our Principal (Dr. S.M Ganeshari) and our Head of the Department (Mrs. Vaishali Rane) for their continuous support and encouragement. We also would like to thank our other faculty members for providing us with all the required resources and references for the project.

DECLARATION

This declaration affirms that our work solely reflects our own original thinking. Where applicable, we've meticulously ascribed credit through proper citations. Integrity underpins our work, and we assure you that no ideas, data, facts, or sources have been misrepresented, fabricated, or falsified. We acknowledge the potential consequences of academic misconduct, recognizing both institutional disciplinary action and legal repercussions for improper use of uncited or unapproved materials. In essence, our work stands firm on the bedrock of academic honesty and transparency.

REFERENCES

- [1] Shalom, G. R., & Nirogi, G. R. (2022, September 30). Decentralized Cloud Storage Using Blockchain. International Journal for Research in Applied Science and Engineering Technology, 10(9), 1294–1300. <https://doi.org/10.22214/ijraset.2022.46810>
- [2] Khalid, M. I., Ehsan, I., Al-Ani, A. K., Iqbal, J., Hussain, S., Ullah, S. S., & Nayab. (2023). A Comprehensive



Survey on Blockchain- Based Decentralized Storage Networks. IEEE Access,11,10995–11015.
<https://doi.org/10.1109/access.2023.3240237>

[3] Kumar B.R, M., & Ms. (2021, April). TheBlockchain-Based Decentralized Approaches for Cloud Computing to Offer Enhanced Quality of Service in terms of Privacy Preservation and Security: A Review. . IJCSNS International Journal of Computer Science and Network Security, 115(April 2021).

[4] Tao, J., & Ling, L. (2021). Practical Medical Files Sharing Scheme Based on Blockchain and Decentralized AttributeBased Encryption. IEEE Access, 9, 118771–118781. <https://doi.org/10.1109/access.2021.3107591>

[5] Wilkinson, Shawn, Jim Lowry, and Tome Boshevski. “Metadisk a blockchain-based decentralized file storage application.” Storj Labs Inc., Technical Report, hal (2014): 1-11

[6] Blockchain for Supply Chain. Accessed: Mar. 25, 2018. [Online].Available:
<https://www.ibm.com/blockchain/supplychain>.

[7] C. Fromknecht and D. Velicanu. (2014). A Decentralized Public Key Infrastructure With Identity Retention. Available:<https://eprint.iacr.org/2014/803.pdf>



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details