IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 8, April 2024

Decentralized Video Sharing Platform using Blockchain and IPFS

Aryan Pandey[1], Deshik Shetty[2], Sakib Malim[3], Shakyasinh Bhise[4], Nita Patil[5]
Students, Department of Information Technology[1,2,3,4]
Faculty, Department of Information Technology[5]
KC College of Engineering, Thane, India

Abstract: *A decentralized video streaming platform represents a unique way of storing video and sharing it to all. This platform is based on Blockchain Technology. This approach eliminates the need for traditional central servers and intermediaries, instead using a peer-to-peer (P2P) distribution model. In this platform, users directly upload the content through frontend made using NextJS. The uploaded content gets stored in IPFS nodes, and a Content Identifier (CID) is returned. Every content gets unique CID making the platform content duplicity resistance. Smart contracts and blockchain are used to operate all the functionalities of the platform. To make any recent changes in the current system, decentralized community uses smart contract and update it accordingly. The ownership of the content remains to the user who had uploaded by mapping its public address to it. Since all the content is shared and stored using blockchain and IPFS, no group or government agency has right over the content. In short, a decentralized video streaming platform provides a unique way of storing content and sharing it among the people without need of any central governing factor*

Keywords: Decentralized, Blockchain, IPFS

I. INTRODUCTION

Decentralized video sharing platform is a platform where users get to upload content, making it visible to all the users. The content uploaded by users gets stored in a decentralized storage (IPFS). Smart Contracts is used to manage all the functionality such as uploading and fetching.

A blockchain is a decentralized, distributed digital ledger that consists of records called blocks. These blocks are used to record transactions across multiple computers, ensuring that once data is added to a block, it cannot be altered retroactively without affecting all subsequent blocks. The security of a blockchain relies on cryptographic principles.

The blockchain network has no central authority; it is the veritable description of a normalized system. Since it is a participated and inflexible tally, the information is open for anyone and everyone to see. Hence, anything erected on the blockchain is transparent and everyone involved is responsible for their conduct. Blockchain is a simple yet ingenious way of passing information from A to B in a completely automated and safe manner. One party to a sale initiates the process by creating a block. This block is vindicated by thousands, millions of computers distributed around the net. The vindicated block is added to a chain, which is stored across the net, creating not just a unique record, but a unique record with a unique history. Tampering with a single content would mean tampering with the entire chain in millions of cases. IPFS represents data as content- addressed blocks and operates on those data blocks using the subsystems. Data is chunked into blocks, which are assigned a unique identifier called a Content Identifier (CID). In general, the CID is reckoned by combining the hash of the data with its codec. CIDs are unique to the data from which they were reckoned, which provides IPFS with the following benefits Data can be brought grounded on its content, rather than its position. The CID of the data entered can be reckoned and compared to the CID requested, to corroborate that the data is what was requested.

Blockchain makes it easier to handle all the details of druggies and content related to it. Smart Contract are tone-executing contract, when formerly stationed it gets executed on its own.

The paper is organized as follows. Section II provides an overview of the literature survey and states findings from the literature survey. Section III highlights some limitations of the existing systems and ways to rectify them. Section IV details the basic concepts and terminologies of blockchain. Section V shows the technologies used and platform

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 8, April 2024

connectivity used for implementation while section VI explains the methodology and section VII demonstrates the results and the analysis, finally section VIII concludes the paper along with future scope.

II. LITERATURE

This section provides a thorough overview of IPFS technology and numerous ways it can be applied to store users' content.

U.Marjit et al. [1] framework presents a unique architecture for OER systems, addressing various drawbacks inherent in centralized platforms. By utilizing the Ethereum blockchain platform, they offer solutions to enhance transparency, traceability, and resilience within the OER ecosystem.

Randhir Kumar et al. [2] present a novel approach to address the issue of copyright infringement affecting the interests of content creators whose images and videos are shared across various online platforms without proper attribution. The authors propose an innovative solution utilizing the InterPlanetary File System (IPFS) and blockchain technology to create a decentralized peer-to-peer image and video sharing platform. Their approach is the use of perceptual hash (pHash) technique for detecting copyright violations. When multimedia content is uploaded to the IPFS platform, its pHash is computed and compared against existing values stored in the blockchain network. Any similarity with previously recorded pHash values indicates potential tampering or copyright infringement.

M. S. Hossan et al. [3] address critical security concerns in ride-sharing services (RSSs), where users may encounter various difficulties such as misconduct by drivers, hiring troubles, verbal abuse, or harassment, highlighting the paramount importance of rider protection. To address these issues, the author uses private blockchain technology, aimed at enhancing the security and accountability of RSSs. Blockchain offers immutability to stored transactions, ensuring that data cannot be altered or tampered with. Key benefits of Hyperledger include its capability to restrict access to information stored within the blockchain to authorized parties only, thereby safeguarding user privacy and preventing unauthorized modifications. In their proposed solution, if users encounter any issues during their ride and report them via the Hyperledger private blockchain, the organization cannot manipulate or delete the existing records. This contrasts with traditional RSS setups, where authorities may be able to alter or erase ride information, potentially leading to unethical practices.

Y. Chen et al. [4] focus on enhancing the performance and reliability of the Interplanetary File System (IPFS). To address these issues, the authors propose an improved P2P file system scheme that builds upon the characteristics of IPFS and integrates blockchain technology. They introduce the concept of content service providers to alleviate high-throughput problems for individual users.

Weijing Li [5] addressed the increasing challenge of data sharing and exchange in the information age. As the volume of data grows exponentially, traditional methods of data sharing face difficulties. To fix these issues, the author proposes a data sharing platform that integrates blockchain and Interplanetary File System (IPFS) technology. The proposed platform not only addresses the challenge of handling large volumes of data but also achieves data decentralization and ensures storage security.

Limitations of Existing System

- Exact Content Duplication: Many existing systems do not verify the existence of the same content uploaded by some other user. This results in content duplication, making it difficult to find the right owner of the content.
- Security Risk: Most of the content uploaded on the platform is not encrypted making it easier for the hackers to tamper with the content.

To address these limitations, the proposed Decentralized Video Sharing Platform has implemented new features to handle these limitations. Content duplication is handled by looking at existing CID and if it presents, it will restrict user from uploading it. Security is enhanced by registering the user public address and mapping the content with its address.

DOI: 10.48175/IJARSCT-17979

IJARSCT

ISSN (Online) 2581-9429

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Impact Factor: 7.53

Volume 4, Issue 8, April 2024

Objectives of the framework

- Secure and efficient storage of content. Our project's main objective is to provide a secure and efficient storage mechanism for content. By using decentralized storage and blockchain, our platform ensures that content of the users is securely stored, encrypted, and accessible to authorized users only.
- User-friendly interface: The platform has a user-friendly interface that allows a user's to register and log-in, upload, and view the content of users.

III. PROPOSED ALGORITHM

Decentralized video sharing platform represents a unique way of video content, it is distributed, consumed, and governed in the digital age. Unlike traditional centralized platforms dominated by a few major corporations, our platform leverages peer-to-peer (P2P) technology and blockchain integration to create a more equitable, transparent, and censorship- resistant ecosystem for content creators and users alike.

At its core, the platform gives greater autonomy and control to users. By eliminating intermediaries and central servers, creators can directly upload their videos to the platform, tokenize them as unique digital assets on the blockchain, access terms according to their preferences. This not only reduces reliance on third-party platforms but also enables creators to reach a global audience.

One of the key advantages of our platform is its censorship resistance. In regions where internet freedom is limited, de-centralized video sharing provides a lifeline for individuals and organizations to share information, culture, and ideas without fear of censorship or suppression. By distributing content across a decentralized network of nodes, the platform makes censorship more challenging, preserving freedom of expression and access to information.

Blockchain technology plays a pivotal role in ensuring transparency, security, and trust within the platform. Smart contracts deployed on the blockchain manage content owner- ship and access control, eliminating the need for centralized authorities or intermediaries. This ensures immutable records of ownership to content creators.

In summary, our proposed decentralized video sharing platform represents a transforming step towards a more open, transparent, and inclusive digital media landscape. By empowering content creators, preserving freedom of expression, and prioritizing user experience and privacy, we aim to redefine the way video content is shared and consumed in the digital age.

A. IMPLEMENTATION

Designing a decentralized video sharing platform involves integrating various technologies, including blockchain, IPFS for decentralized storage, and a front-end framework for user interaction. In this scenario, we will use Ethereum as the blockchain environment, with Ganache for local development, Truffle for deployment, MetaMask for Ethereum transactions, IPFS for storage, and Next.js with Web3.js for the front-end and blockchain interaction.

The platform enables users to upload, share, and view videos, with blockchain managing transactions and IPFS handling video storage. Smart contracts will govern interactions, including video uploads, access control.

1. Smart Contracts

Develop smart contracts in Solidity to manage the platform’s core logic:

- Video Uploads: Store video metadata (e.g., IPFS hash, title, description) on Ethereum.
- Access Control: Manage who can view or interact with videos based on criteria (e.g., subscription).

Deploy and test these contracts using Truffle and Ganache before deploying to the Ethereum mainnet or a testnet.

2. Decentralized Storage with IPFS

When a user uploads a video, the platform stores it on IPFS, which returns a hash of the content (content identifier). This hash is stored on Ethereum via smart contracts, linking the video content securely and immutably to the blockchain.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 8, April 2024

3. Front-End Application with Next.js and Web3.js

- Next.js: Develop the user interface, including pages for video listing, upload forms, and video playback. Next.js enables server-side rendering for improved performance and SEO.
- Web3.js: Integrate Web3.js to interact with Ethereum smart contracts. It allows the front-end to perform actions like sending transactions, querying smart contract states, and reacting to events.

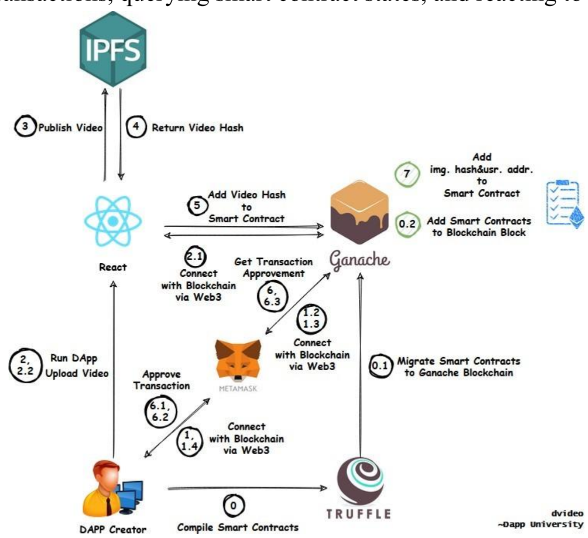

Fig. 1. Proposed Algorithm

4. MetaMask Integration

Users will use MetaMask for transactions (e.g., tipping creators, paying for access). MetaMask handles account management and transaction signing, providing a secure way to interact with Ethereum from the browser.

Technology Used

- Ethereum Blockchain: For smart contracts and transactions.
- Ganache: A local blockchain for development and testing.
- Truffle Suite: For compiling, deploying, and managing smart contracts.
- MetaMask: A browser extension wallet for Ethereum transactions.
- IPFS (Interplanetary File System): For decentralized video storage.
- Next.js: A React framework for server-side rendering and generating static websites.
- Web3.js: A collection of libraries to interact with Ethereum nodes.

IV. METHODOLOGY

A decentralized video sharing platform involves several steps, integrating blockchain with a smart contract, IPFS for decentralized storage, and a user interface built with Next.js. The homepage serves as the gateway to the platform, displaying featured videos. A responsive grid layout ensures that users of all devices can navigate and explore video content effortlessly.

On the video upload page, content creators are given with a form that prompts them for essential information about their video—title, description, and provides an option to upload the video files. Integration with IPFS is crucial here; once a video is uploaded, it is stored on this decentralized network, ensuring it is resistant to censorship and loss. The subsequent step involves using Web3.js to register the video's metadata, including its IPFS hash, on the Ethereum blockchain. This process not only secures the content's provenance but also facilitates its retrieval and streaming. Providing real-time feedback during the upload and registration process helps maintain transparency with the user, informing them of the transaction status and any confirmations or errors.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 8, April 2024

The subscription page offers a functionality: Subscribe to their favorite content creators, and it provides a way for managing existing subscriptions. This page displays a list of channels the user is subscribed to, with options to view each channel's content or unsubscribe. Subscription payments are handled through Web3.js, enabling transactions in cryptocurrency via MetaMask.

The video viewing page is where the platform's content truly comes to life. An IPFS-based video player streams content directly from the decentralized storage network, offering a full suite of playback controls. Video metadata—such as title, description, upload date, and creator information—is prominently displayed, enriching the viewing experience with context.

V. RESULT ANALYSIS

Despite these challenges, the decentralized video sharing platform represents a different approach compared to traditional centralized platforms.

Metric	Before Implementation	After Implementation
Upload Time (s)	N/A	5
Retrieval Time (s)	N/A	2
Transaction Cost (ETH)	N/A	0.005
Network Latency (ms)	N/A	120

VI. CONCLUSION

In conclusion, the development and implementation of a decentralized video sharing platform by using blockchain technology and IPFS for decentralized storage, we have addressed key challenges such as censorship, data ownership, for content creators.

Through our platform, users can upload and share without relying on centralized intermediaries.

Moreover, our platform prioritizes user privacy and data security, by using blockchain's immutable nature and IPFS's decentralized architecture. Users have full control over their content and personal information, reducing the risk of exploitation by third parties.

Scalability remains a challenge, especially as the user base grows and the volume of content increases. Additionally, user experience enhancements, such as improving upload and retrieval times, optimizing transaction costs, and enhancing content discovery algorithms, are areas for future focus.

VII. FUTURE SCOPE

The development of the decentralized video sharing plat- form opens various avenues for future exploration and enhancement:

- Scalability: As the platform grows in terms of user base and content volume, scalability becomes a critical concern. Exploring layer 2 scaling solutions such as state channels or sidechains could help alleviate congestion on the Ethereum network and reduce transaction costs.
- Content Discovery: Enhancing content discovery algorithms can improve user engagement and retention. Implementing personalized recommendations based on user preferences, viewing history, and social interactions can enhance the platform's usability.
- Community Governance: Implementing community governance mechanisms can empower users in platform decision- making processes. Using decentralized autonomous organizations (DAOs) or token-based voting systems can foster a sense of ownership and decentralization among platform users.
- Interoperability: Enhancing interoperability with other de- centralized applications and platforms can create a more
- Accessibility: Improving accessibility features ensures that the platform is inclusive and accessible to users with disabilities. Implementing features such as screen reader compatibility, keyboard navigation, and captioning can enhance the user experience for all users.

IJARSCT

ISSN (Online) 2581-9429

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Impact Factor: 7.53

Volume 4, Issue 8, April 2024

By exploring these avenues for future development, the decentralized video sharing platform can continue to evolve and adapt to the changing needs and expectations of its users, ensuring its long-term sustainability and relevance in the decentralized web landscape.

REFERENCES

[1]. U. Marjit and P. Kumar," Towards a Decentralized and Distributed Framework for Open Educational Resources based on IPFS and Blockchain," 2020 International Conference on Computer Science, Engineering and Applications (ICCSEA), Gunupur, India, 2020, pp. 1-6, doi: 10.1109/ICCSEA49143.2020.9132841.

[2]. Randhir Kumar, Rakesh Tripathi, Ningrinla Marchang, Gautam Srivas- tava, Thippa Reddy Gadekallu, Neal N. Xiong, A secured distributed detection system based on IPFS and blockchain for industrial image and video data security, Journal of Parallel and Distributed Computing, Volume 152,2021, Pages 128-143, ISSN 0743-7315.

[3]. M. S. Hossan, M. L. Khatun, S. Rahman, S. Reno, and M. Ahmed," Securing Ride-Sharing Service Using IPFS and Hyperledger Based on Private Blockchain," 2021 24th International Conference on Computer and Information Technology (ICCIT), Dhaka, Bangladesh, 2021, pp. 1- 6, doi: 10.1109/ICCIT54785.2021.9689814.

[4]. Y. Chen, H. Li, K. Li, and J. Zhang," An improved P2P file system scheme based on IPFS and Blockchain," 2017 IEEE International Conference on Big Data (Big Data), Boston, MA, USA, 2017, pp. 2652- 2657, doi: 10.1109/BigData.2017.8258226.

[5]. Weijing Li, Zicheng Zhou, Wen Fan, Juan Gao," Design of Data Sharing Platform Based on Blockchain and IPFS Technology," Wireless Communications and Mobile Computing, vol. 2022, Article ID 3937725, 7 pages, 2022. https://doi.org/10.1155/2022/3937725