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Decentralized Web Hosting Platform and Framework

Aniket Diwate[1], Priya Waghulkar[2], Shrutika Patle[3], Tejas Kadam[4], Prof. Mohommad Tahir[5], Vrushant Domde[6]
[1, 2, 3, 4, 5, 6]*Department of Information Technology, G H Raisoni College of Engineering, Nagpur-440016 India*

Abstract: ***This paper suggests a decentralised web hosting solution based on Web3 Storage and the Interplanetary File System (IPFS). The IPFS platform is used to host websites and store data. To guarantee that the source codes of the websites and users' data are preserved over the long term, all storage miner nodes on the IPFS network provide the pinning service. Websites must use an encryption technique for data storage that protects user privacy. The suggested model integrates the Web3 Storage and IPFS networks to create a platform that offers decentralised site hosting. The suggested platform guarantees the privacy, availability, and integrity.***

Index Terms: Interplanetary File System (IPFS), Web3 Storage, web hosting, decentralisation

I. INTRODUCTION

The Internet is dominated by client-server architecture at the moment. This indicates that any service that uses a server almost certainly has a specific owner for that server. Due to its fault tolerance, attack resistance, and collusion resistance, a decentralised system is typically encouraged. Decentralized network protocols typically rely on dispersed systems or peer-to-peer networks as a result, which can aid in the fight against government censorship and the monopoly threat posed by large tech companies. However, as it stands, the web is very centralised. Today, data is a valuable resource for organisations that gather and use all types of data. It is also a worry for all web service customers.

Numerous concerns have been raised regarding the protection of user privacy, their ability to govern their personal data, and all issues relating to data storage, processing, and security. Web apps have several advantages for both individuals and enterprises. that can offer services like online shopping, social networking, banking, web mail, interactive information, etc. Client-server architecture is the foundation for almost all web applications.

II. MOTIVATION AND PROPOSED SOLUTION

Decentralized networks allow participants to share control over infrastructure and other technologies rather than having it enforced by powerful (”central”) actors. This control can take many different forms, including ownership of web in-frastructure (such as servers or portals), ownership of data, influence over network decisions, the ability to delete contents, and the ability to choose who has access to the network's shared capabilities, knowledge, and information. For instance, Amazon's Cloud is a distributed network where the data is stored across a grid, but still governed by a central entity, but Facebook is a concentrated network where data is controlled by a central entity.

Client-server architecture involves the storage of website source codes and data on centralised servers, and the usage of browsers by users to send requests to these web servers. However, this architecture has the following drawbacks.

1) *Data Protection:* Any person with access to the systems can access, modify, or remove data.
2) *Accessibility:* Data is accessed by web servers using location-based addressing. Users cannot access their data if the centralised services fail (due to overload, denial-of-service, distributed denial-of-service, or system prob-lems).

We offer a decentralised web hosting solution based on IPFS and Web3 Storage technologies to get around these restric-tions. The IPFS platform has the advantages of decentralised storage and content-addressability.

III. IPFS

A peer-to-peer distributed file system called Inter-planetary file system (IPFS) was proposed by Juan Benet in 2014. IPFS nodes possess a key pair and communicate with one another directly over a peer-to-peer network. Which uses the private key to sign in to the IPNS service while the public key is used to create NodeID. In order to establish a connection, two nodes must first exchange public keys. If the NodeID does not match the public key being exchanged, the connection is broken. There are essentially three different types of nodes: client nodes, retrieval miner nodes, and storage miner nodes.

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1) *Client Node:* The node exclusively stores and retrieves files via the IPFS network. It does not, however, offer its storage space to the IPFS network.
2) *Retrieval Miner Node:* This node on the IPFS network makes storage space available to store files for other nodes. However, the garbage collection function of IPFS saves and deletes the files kept on this node transiently.
3) *Storage Miner Node:* The node makes storage capacity available to the IPFS network and permits the pinning service to store files for an extended period of time.

Distributed hash tables (DHTs), which are owned by each miner node on the IPFS network, are used to store file locations and connectivity data. To provide peer and content discovery on the IPFS network, the IPFS system uses a DHT. S/Kademlia is the DHT used by the IPFS system at the moment. Key-value mappings are stored in a distributed hash table that aids IPFS in locating a peer node that holds the requested data or a path to that node. The distributed hash table that each node on the blockchain maintains is used to locate and provide the value when a key is requested. A key could be a peer ID, an Interplanetary Name System (IPNS) key, or a unique identification for data. In an IPFS distributed hash table, there are three different kinds of records.

Type	Purpose
Provider records	Map a data identifier with a peer ID that has the data
IPNS records	Map an IPNS key with an IPNS record
Peer records	Map a peer ID with a set of close peers that can reach the peer ID

Fig. 1. Workflow of project

a) Data Storage: IPFS objects, each of which may hold up to 256 kilobytes of data, are where files are kept. A data structure called an IPFS object has two fields: Binary data is kept in the data field, while the links field contains a list of links to all the other parts of the file, organised in an array. A link structure consists of the following three elements:

- *Name:* The link's name or alias.
- *Hash:* The linked object's cryptographic hash.
- *Size:* The linked object's overall size..

b) *Pinning Service:* Storage miner nodes employ the IPFS pin-ning service to pin significant items in order to keep the files accessible to the community. Therefore, any pinned objects are always exempt from destruction when the trash collection is initiated on miner nodes.

c) *IPNS:* The cryptographic hash of an object's contents is used to identify it on the IPFS network. In order to find the objects, IPFS miner nodes use the associated hash values.

Additionally, when changing an object's content to create a new version, a new hash value is created as well. As a result, the IPNS permits nodes to sign published mutable objects using their private key and publish them using their NodeId.

By doing this, other nodes can only access changeable objects through the same link. An IPNS link should, however, be mapped with a domain name because it is exceedingly difficult to remember. For instance, example.com is mapped to /ipns/your peer id¿. The TXT record is a sort of resource record that the DNS offers in order to link any text with a domain name.

A peer-to-peer data storage system called IPFS can be used to store data for blockchain networks and decentralised apps efficiently. The IPFS platform is crucial for decentralised site hosting.

IV. WEB3 STORAGE

web3.storage is a smart contract that allows to store files across multiple blockchains in a decentralized manner. Web3.Storage is a new type of decentralized, infinitely scal-able, and self-sufficient data storage service. It's designed to operate in a redundant peer-to-peer architecture similar to Bitcoin, Ethereum or IPFS. Web 3 Storage is a decen-tralized, trustless and worldwide persistent unique storage that is secured by the blockchain technology. It provides a highly transparent and reliable data backup service—hence, it simplifies and rationalizes all your data backups from multiple devices to a single safe and secure location.

The Web3.Storage is the bridge between a storage and a library. The storage is responsible for storing the data, and the library does some work on that data. Web3.storage is a hosted solution for storing data online on the IPFS. It's a simple way to store large files like photos, videos, and documents without any network fees and without any fees to upload or download them again. The aim of Web3.Storage is to help you easily backup and share files on the Web. We are committed to creating a library that is easy to use and highly secure for all its users

A. How does it Works?

Web3 provides a web storage API built on top of the Ethereum blockchain. It allows app developers to store their data in a secure, distributed way on the blockchain, and returns access using ethereum or Web3 accounts.Web3.Storage provides a secure key-value store running on blocks that can be stored locally or replicated and shared with other peers in the network.

Data delivered to Web3.Storage is immediately pinned to an IPFS Cluster of three geographically scattered nodes hosted by Protocol Labs. It is then queued to be stored on the Filecoin network. It is packed with other data in a Filecoin transaction while in this queue, and then stored with at least five geographically spread miners. It is also pinned to other IPFS pinning services, such as Pinata, for added redundancy and availability!

V. METHODOLOGY

In this model we tried to provide solution for hosting static website decentralized.

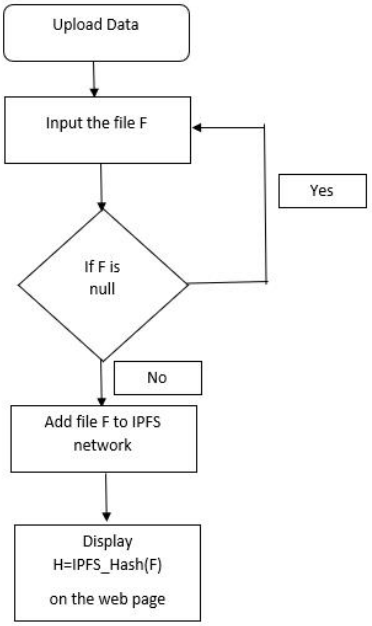

Fig.2. Workflow of project

The actions to be taken in our decentralised hosting platform are as follows:

1) Upload a static website file to be hosted
2) Enter the details about the website, that will be included in metadata URL.
3) Upload: By clicking upload button content of file stored on IPFS and now file is hosted decentralized i.e., on IPFS.
4) Get the hosted URL.
5) Get the metadata URL.

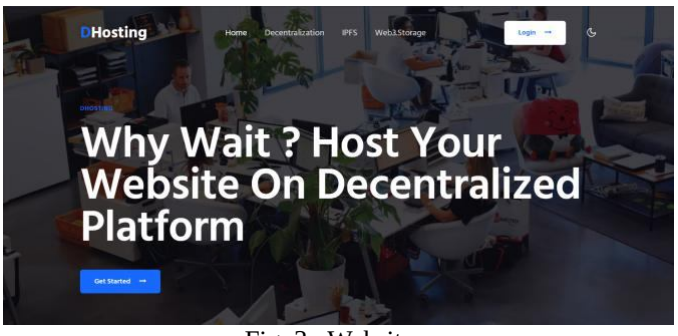

Fig. 3. Website

A. Software Used

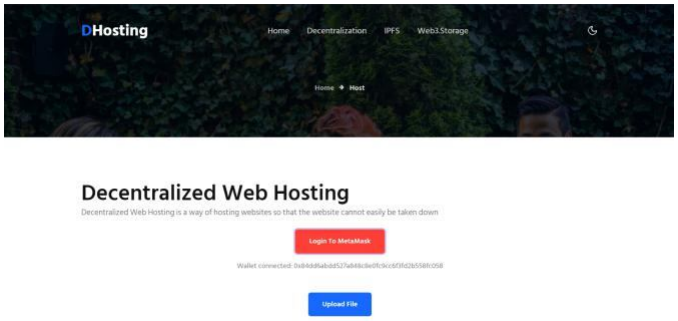

Fig. 4. Website

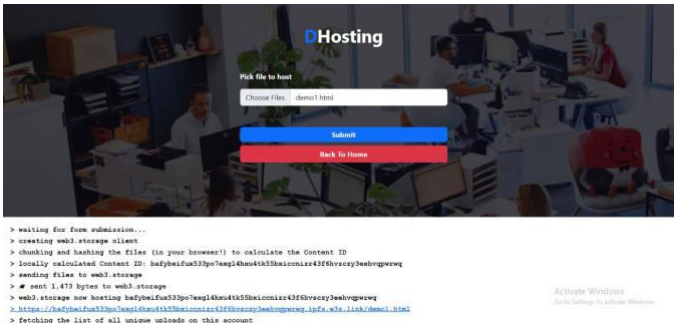

Fig. 5. Website

It also offers a robust ecosystem of extensions for additional languages and runtimes, including C++, Java, Python, PHP, Go, and.NET.

Metamask Extension: MetaMask is a famous cryptocur-rency pockets mentioned for its simplicity, availability on each computer and cell devices, the cappotential to buy, transmit, and get hold of cryptocurrency from inside the pockets, and the cappotential to collect non-fungible tokens (NFTs) throughout blockchains.

VI. CONCLUSION

This study aims to shed light on technologies that would make the internet a more free and open space where everyone may express themselves. This study has demonstrated how a decentralised network, which distributes files in blocks among many seeders, may be the answer to this issue. A few reoccurring issues were resolved with each iteration, but each was followed by a fresh set. Although it has been progressing at a steady pace, Web 3.0 is still in its early phases of development and adoption by regular web users. In order to encourage the growth and development of dapps, Web 3.0 has introduced a vision of a decentralised internet where each user owns their own data and utilises the web without a central authority regulating the space.

VII. FUTURE SCOPE

Visual studio code: It runs on your desktop and is compat-ible with Windows, macOS, and Linux. Visual Studio Code is a compact but effective source code editor. In addition to having built-in support for JavaScript, TypeScript, and Node.js,

One of the few real drawbacks of the Web2 and Web1 paradigms is the increased number of outside vendors that compromise organizational independence and data integrity. In a perfect world, you wouldn't have to worry about these things because you could trust your provider would always be by your side and never misuse your information.

1) The platform is currently purpose-built to host static websites only, but in the future, it may be extended to host dynamic websites as well. Also, our project does not use blockchain yet, so we may host our website on blockchain in the future.

2) We believe that the future of decentralized hosting will be built on the foundation of Web3 and blockchain technology. Using a client-side access to the Ethereum blockchain, our offering allows for greater security and privacy, consistent performance and lower costs.

3) Decentralized hosting is a new breed of internet infras-tructure that uses the blockchain. Decentralized hosts are accessible through the browser and don't require installation of software on a user's computer to run. The concept is to create a new type of network for hosting large files, which can compete with traditional cloud-based providers like Amazon Web Services (AWS) in terms of performance and cost/performance

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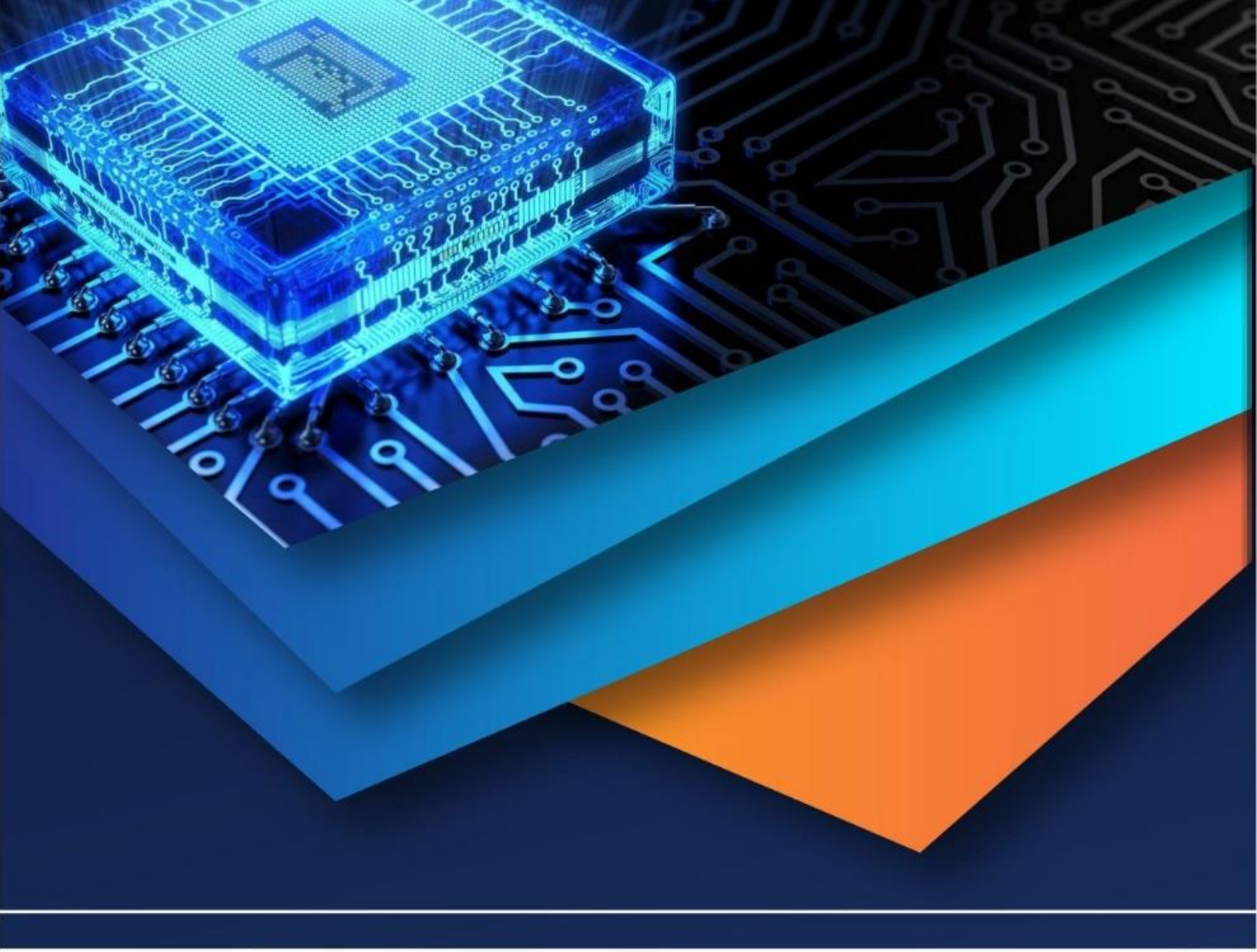

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