IPFS Based Decentralised Twitter Using Web 3.0 Technologies

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ABSTRACT

Blockchain technology is one of the most rapidly growing technology in today's world. Decentralised application uses smart contracts for operating its application. Ethereum is a blockchain platform its network currency is termed as (ETH). Bitcoin is another digital currency of blockchain It is used to store data in distributed form. Smart contract is a block of program that runs on the blockchain. The concept of decentralized application came into existence when a single server gets all the load in the centralized application. Interplanetary file system (IPFS) is distributed data storage service to support a decentralized application. Dapp runs in an open-source environment. In contrast an app's backend code, runs on a centralized server or multiple centralized servers. This paper involves research on blockchain technology with the use of smart contract and the use of distributed storage that is (IPFS).

Keywords: - Blockchain, Transaction, Smart Contract, IPFS, Web3storage.

1.INTRODUCTION

Satoshi Nakamoto was the first one to introduced Bitcoin to the world [1]. Blockchain is the trendiest technology nowadays. It is used to store data in distributed fashion. Before the use of blockchain all social media apps relied on a single server that is centralized server. In centralized application that is simple client-server model there was many times failure in providing the services to the users using the centralized application. But as technology advances, Decentralised application that have multiple servers involve that no single authority holds the power so that there is no issue in providing the services to the users. Smart contract is like a contact between two party, it is built in smartness [5]. There are many researches that has been done in order to solve the problem related to server down because of which the users face many issues and there are many solutions to this problem occurring on social media.

Nowadays there are many attacks such as Dos and DDos attack that are possible on the application a user is using but the use of blockchain technology the data is unchangeable as well as it is protected and there is less or no changes of attacks that are possible. Social medias are the most important source of income nowadays and as everybody is on social media the number of users using social media is increasing day by day. Making a decentralized social media app will be helpful because there is not a single server but multiple servers involve in the application. Interplanetary file system (IPFS) is a distributed storage system, there are many distributed storage services available today one of which is web3 storage that is very flexible to work with [3]. As technology is advancing cloud storage such as web3 storage is a great option to store images that is exceeding its size whereas blockchain where each block has a fixed size so it can be used to store the text, because generally the size of the text is small so it can be fitted in the chain of blocks that is connected.

2. EXISTING SYSTEM

Twitter is an extremely popular online social and networking platform [2]. Twitter was created by Jack Dorsey, Noah Glass, Biz Stone, and Evan Williams in March 2006 and launched in July of that year. Twitter, Inc. is based in San Francisco, California and has more than 25 offices around the world [4]. By 2012, more than 100 million users tweeted 340 million tweets a day, and the service handled an average of 1.6 billion search queries per day. In 2013, it was one of the ten most-visited websites and has been described as "the SMS of the Internet. There are around 500 million users and around 200 million are active at any point of time. The system is highly available, most reliable and scalable. Users should be able to create tweets anytime and tweets should not be lost. The acceptable latency is 200 milliseconds.

2.1 Existing Architecture

With this data let's understand the capacity of the system. There are around 200 million users active every day. Most of the tweets are text and size are approximately below 1KB. But if we assume image and video it can go up to 10MB. So, assumption of 1 MB of each tweet is a good approximation.
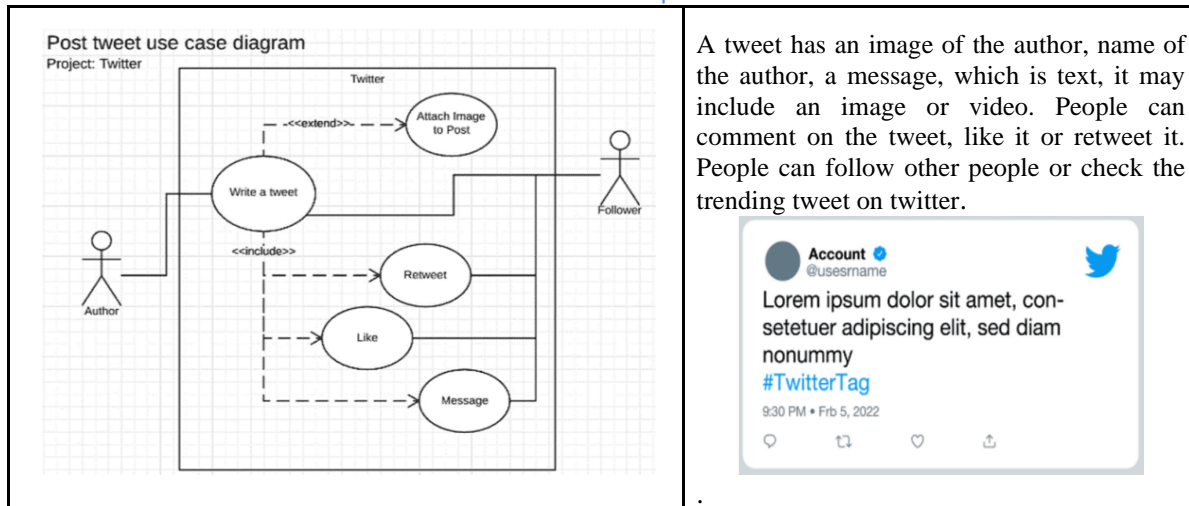
A tweet has an image of the author, name of the author, a message, which is text, it may include an image or video. People can comment on the tweet, like it or retweet it. People can follow other people or check the trending tweet on twitter.

Fig.-1: Existing System

2.1.1 Write Capacity

let's assume 25% of the users create a tweet per day.

This means => 50 million tweets per day.

1 Day => 50 million * 1 MB => 50,000,000 * 1,000,000 => 50 TB approx.

1 Year => 50 TB * 365 => approx. 20, 000 TB => 20 PB written every year.

If we assume that this is 70% capacity then => 30P B /year.

If we assume that write speed of each server is 80MB/sec

then per second we require (50,000,000 MB / (24 * 60 * 60)) => 580 MB/secs.

This means 580/80 => approx. 8 servers for writing the data.

2.1.2 Read Capacity

Most of the users are reading the tweet

This means => 200 million per day.

1 Day => 200 million * 1 MB => 200,000,000 * 1,000,000 => 200 TB approx.

1 Year => 200 TB * 365 => approx. 80, 000 TB => 80 PB read every year.

If we assume that this is 70% capacity then => 100 PB / year.

If we assume that write speed of each server is 160MB/sec

then per second we require (100,000,000 MB / (24 * 60 * 60)) => 1157MB/sec

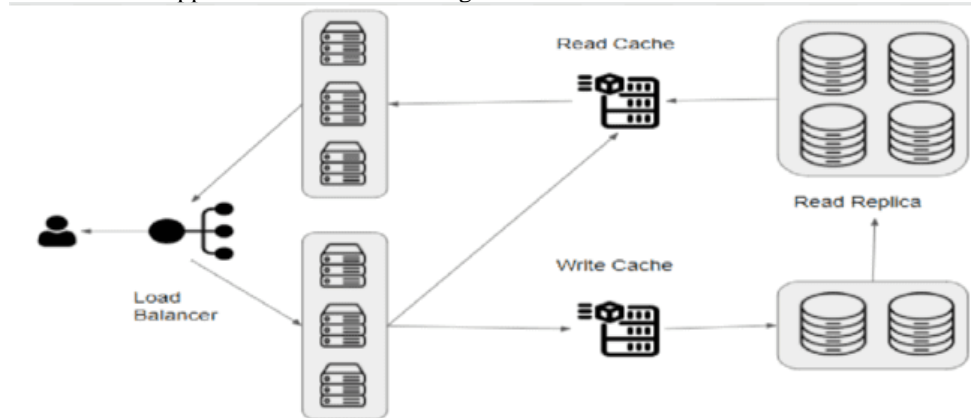This means 1157/160 => approx. 8 servers for reading the data.

Fig- 2 Existing Architecture

We need a group of servers for reading and writing. These servers are behind the load balancer to handle scalability. They are backed by cache for providing low latency. The database is also Shard based on the location. In order to handle a read heavy system a read replica of the database is provided. The cache is updated on each write. The recent data is there in the cache.

The above is the existing twitter architecture.

2.2 Problem with Existing System

- It is owned by a private company, which means they can develop policies that can put them in benefit and/or others at disadvantage.
- The policies they developed are not governed by central authority as in the case of the internet where everything is standard.
- They can block any account or tweet so independence is not guaranteed.
- In the past few years, we have seen lots of fake accounts run by bots which are basically used to sabotage a government or company of any country. They can change the trend on twitter.
- It will be difficult to track if somebody hacked an account or changed the tweet by hacking the server.

3. PROPOSED SYSTEM

Decentralized social media could be a social media platform that is built on decentralized protocols, such as blockchain technology or peer-to-peer networks. The goal of such a system would be to give users more control over their data and content, and to promote greater privacy and security. Decentralized social media using blockchain is a new approach to social networking that utilizes blockchain technology to create a decentralized network where users can communicate and share content without the need for a centralized server [10]. The purpose of this system is to provide users with a secure and private social networking experience that is not controlled by any single entity or authority. The system comprises several components, including a blockchain network, a smart contract system, and a user interface. The blockchain network provides the underlying infrastructure for the system, while the smart contract system helps to facilitate interactions between users [5]. The user interface allows users to interact with the system and perform various actions, such as uploading image, commenting on tweet, and following other users.
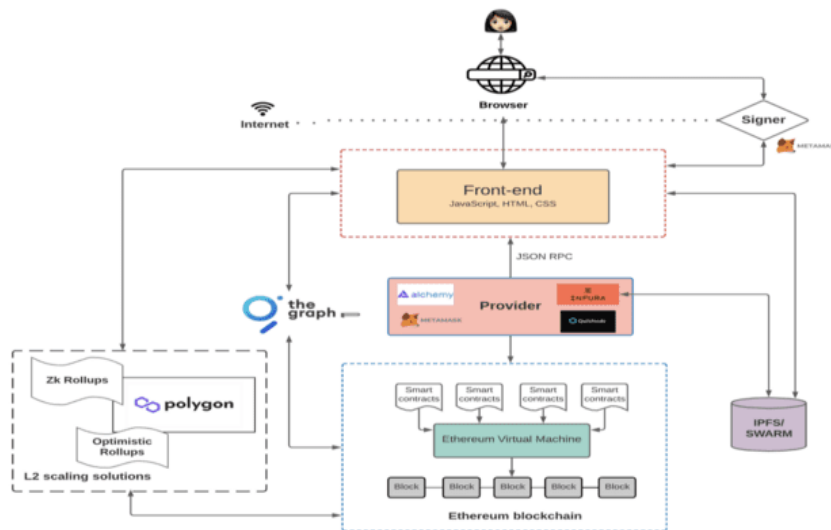

Fig.-3 Proposed System

4. METHODOLOGY

The very first step is to choose a blockchain platform like Ethereum, polkadot and Solana. Then, we have to identify the problem with existing centralised social media and the way decentralised application overcome the disadvantages of centralised social media and the scope of the project. Once, the scope and problem are defined then you will have to define the components of the DApp and design its architecture. Also, it is important to know why creating the DApp and what problem the existing system faces so there was a need of this decentralised app. After the problem and scope is define platform is chosen then, we have to write smart contract for our DApp, this will power the DApp, smart contract can be written in languages such as solidity, rust etc. Then developing a user interface which is intuitive and user-friendly, moving on to integrate the backend infrastructure, this includes setting up servers, APIs and other components. After everything is integrated properly then testing the DApp is important task while one has to check the security vulnerabilities, user experience and functionality. Then, deploy the DApp in the blockchain, maintain and update the DApp. Overall, building a decentralized application with Web 3.0 technologies requires a strong understanding of blockchain, smart contract programming, and user interface design. It is a complex process, but it can lead to powerful and innovative solutions to real-world problems.

5. RESULT

For getting the final view of the project there will be need of any web browser that will display the react app and accordingly the user have to login with their MetaMask wallet which will open the home page, where the user can tweet the images and tweet with their MetaMask Id.
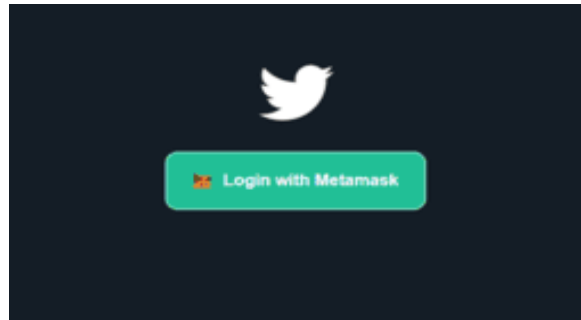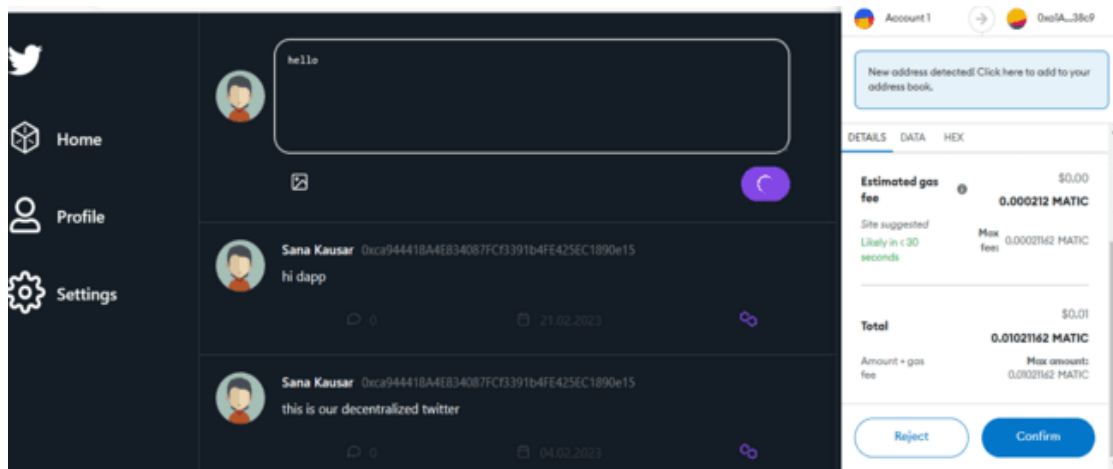

Fig-4 Login with MetaMask
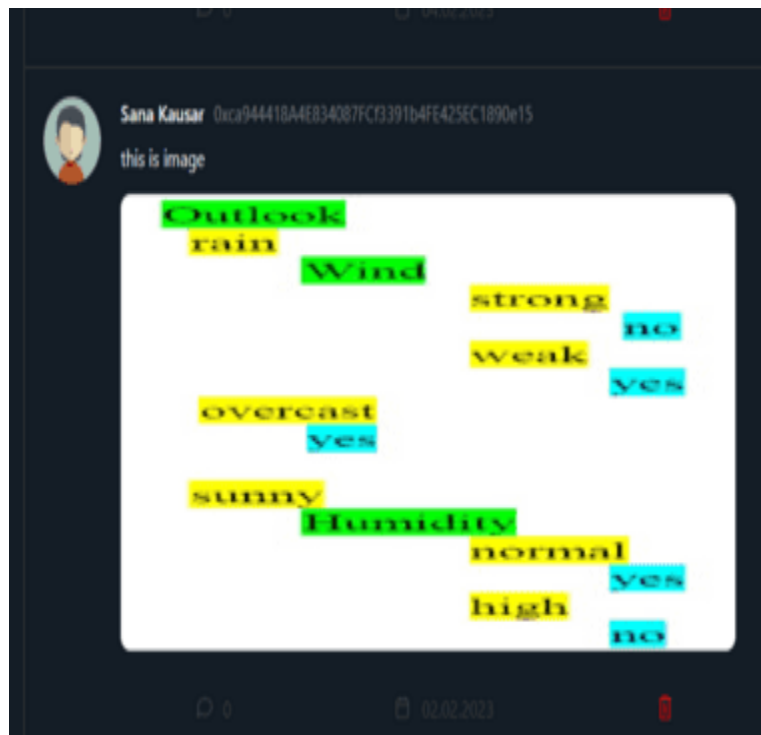

Fig-5 Matic Transaction For Tweeting

Fig-6 Tweeting Images

6.CONCLUSIONS

We can build the Twitter DApp using the Web3.0 Technologies which is Distributed, not owned by any individual or company. It is open source, reduces the cost of maintenance. Highly traceable, Hackproof, cannot be hacked or modified. There is a cost associated with each transaction that will prevent the fake accounts. But the problem is it is slow, and each tweet signing with MetaMask is a bad user experience. We still have to wait for the technology improvements and then most of the database and web 2.0 applications can be moved to Blockchain. The main objective of a dApp is to promote trust, security, and transparency in the application by removing the need for intermediaries, central authorities, or trusted third parties.

REFERENCES

[1] S. Nakamoto, "Bitcoin: A peer-to-peer electronic cash system," 2008.

[2] "About Twitter" Archived April 3, 2016, at the Way back Machine Retrieved April 24, 2014.

[3] IEEE 24th International Conference on Parallel and Distributed Systems (ICPADS) 2018.

[4] Rosen, Aliza (November 7, 2017). "Tweeting Made Easier". Twitter Blog. Retrieved November 7, 2017.

[5] Junichiro, Narnian Lee, Chien Chi, YI-Hua Chen, Blockchain and Smart Contract for Digital Certificate, Proceedings of IEEE International Conference on Applied System Innovation 2018.

[6] Zibin Zheng, Shaoan Xie, Hong-Ning Dai, Xiangping Chen, An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends, IEEE 6th International Congress on Big Data, 2017.

[7] Emmanuel Nyaletey, Reza M. Parizi, Qi Zhang, Kim-Kwang Raymond Choo, BlockIPFS – Blockchain-enabled Interplanetary File System for Forensic and Trusted Data Traceability, IEEE International Conference on Blockchain 2019.

[8] Bartoletti, M., & Pompianu, L. An empirical analysis of smart contracts: Platforms, applications, and design patterns. In Brenner, M., Rohloff, K., Bonneau, J., Miller, A., Ryan, P. Y. A., Teague, V., Bracciali, A., Sala, M., Pintore, F., & Jakobsson, M. (Eds.), Financial (2017).

[9] Bandyopadhyay, P. The origin of blockchain – from cypherpunks to Satoshi to IBM. Medium. https://medium.com/datadriveninvestor/cypherpunks-to-satoshi-toibm819ebcfdd674Google Scholar (2018, December 3).

[10] An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends, IEEE 6th International Congress on Big Data, 2017.