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WEB 3.0 – The Decentralized Form Of The Internet

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Abstract- Web3.0 is the third iteration of the internet, which mainly focuses on the decentralization of the internet. It works on the principle of blockchain, which uses encryption and distributed computing as its core technology. Data stored in the web3 can be accessed by the user and they hold the ownership of their data, rather than being stored in a single entity like in web2. Tokens are rewarded for the users in web3, which can be used for a variety of purposes. The main advantage of web3 is the decentralization of data, where the internet is democratic. Data stored in web3 are much more secure because of blockchain technology, and one of the demerit is its way too technical for a normal user or nontechnical person to understand and use it.

Keywords- Web3.0; Internet; Decentralization; Blockchain; Encryption;Web2.0; Ethereum; Cryptocurrency

I.INTRODUCTION

Web 3.0 is the third generation of the internet followed by the first and second iterations web1.0 and web2.0. The current generation of the internet, web2.0(where the internet can be accessed by anyone, is simpler to use, much more interactive, and far better than compared web1) is the evolved version of web1 (the first iteration of the internet or the starting phase of the internet, where the sites can be used by larger corporations and users were charged to view those static sites).

Since, web2.0 is mostly defined by social media applications, which let every user on the internet, interact in a better way. Blogging, video streaming, voting, content creation, social networking, etc was made easier in the current state of the internet(web2.0). An internet connection is needed alone to access the web without any permission. Even though, all the features are there on the web2.0, they are quick, simple, responsive, and interactive, What made it process the next generation of the internet? Is Web 2.0 a flaw? Or Is web 2.0 isn't sufficient for the users on the internet? No, one of the main key reasons, which lead to the creation of web3.0, is the centralization of data In this paper, we will explore the concept of Web 3.0 in detail, including its history, key features, and potential applications. We will also examine some of the challenges facing web3 and the efforts being made to overcome them. Finally, we will discuss the future of web3 and its potential impact on the internet and society as a whole.

II.WEB 3.0

The term web3.0 was first coined by Gavin Wood, the founder of Blockchain Infrastructure Company Party Technologies in 2014. He coined the term web3.0, with an ideal vision to make this internet truly decentralized. Web3.0 is defined in a few different ways, but its core idea is decentralization. The ultimate goal of it is to make a democratic internet. Currently, web3.0 is in its infancy stage, and many

VCs and LPs are investing a lot in this new technology to make a decentralized internet. Unlike the static pages on web1.0 and data being reliant on big tech giants in web2.0, web3.0 makes the internet more democratic, with blockchain technology as its backbone. Since blockchain works on the principle of encryption and distributed computing, it creates a publicly visible ledger of records that can be accessed by anyone and is decentralized. Technologies like cryptocurrencies and NFT works with blockchain too. They both play a vital role in web3.0. Users in the web3 are rewarded with some digital tokens, which can be used in a variety of ways, like currencies, digital licenses, votes, etc that can influence future technology. Since those tokens were on the web and can be accessible by anyone, privacy might be questionable.

That's where the NFTs come to play. NFT refers to the term Non-Fungible Token, as per the term non-fungible, it's the only unique thing that exists. It assigns ownership to a user's digital item using Ethereum blockchain technology. Those digital items can be art, JPG image, music, video, etc. In a nutshell, those NFTs can be publicly accessed by anyone, but the ownership of that digital token is stored in an ETH block chain. Web3.0, at its current stage, Ethereum is the block chain, that attracts many users to the web3.

The use of crypto currencies and NFTs is also significant in web3.0, as they incentivize users and allow them to own and trade digital assets. Since its, the technology behind the NFTs and Ethereum cryptocurrency Web3.0 is a relatively new technology that is still in its infancy stage. However, its potential to revolutionize the way we interact with the internet is undeniable. The use of blockchain technology in web3.0 enables decentralized applications to operate on a trustless, distributed network, making it more secure and democratic.

The development of decentralized finance (DeFi) and decentralized identity (DID) systems on the Ethereum blockchain is another significant aspect of web3.0. Web3, built on blockchain technology, promises to transform the internet by enabling a more decentralized and democratic web. It has several potential use cases across industries, including Decentralized Finance (DeFi), digital identity, supply chain management, content creation and distribution, gaming, and voting and governance. DeFi applications like Aave, Uniswap, and Compound are gaining popularity, while projects like uPort, Civic, and SelfKey are exploring the use of Web3 for digital identity management. Web3 can also enable a more equitable system for content creation and distribution, with projects like Rarible, SuperRare, and OpenSea already exploring this use case. The gaming industry can benefit from Web3 through decentralized and transparent gaming ecosystems, with projects like Axie Infinity, The Sandbox, and Decentraland already exploring this use case. Lastly, Web3 can enable more transparent and democratic voting and governance systems, with projects like Aragon, DAOstack, and Gnosis Safe already exploring this use case.

However, the technology still faces significant challenges, such as scalability and interoperability, must be addressed to achieve its full potential. With the continued investment and development of web3.0 technology, it is likely that we will see a new era of the internet that is more democratic, secure, and accessible to all. Web3.0 is still in its infancy, and there are many challenges that need to be addressed before it becomes main stream. These include issues such as scalability, interoperability, and user experience. Nevertheless, there are already many exciting developments in the web3 space, including decentralized applications, decentralized finance, and non-fungible tokens.

III.WEB 3.0 IMPLEMENTATION

Web3.0 is still unstable and it is in its infancy stage. The implementation of web3 can be done by Dapps(Decentr alized Applications). They are merely applications, that are open-source software that runs on a blockchain using smart contracts and other programs. Those Dapps run on a network or set of nodes, rather than being operated in a single entity in web2.0.

Instead of using passwords, they use a seed phrase to secure an account, which will be a set of sequential phrases, which is used to access an account. Using Ethereum blockchain, these Dapps are created. Platforms and apps built on web3 won't be owned by a gatekeeper, but by a user, who will earn their ownership stake by helping to develop and maintain those services. The greater development and combining of Dapps and protocols led to the development of DeFi(Decentralized Finance). DeFi is the technology, which is used to manage financial transactions. Unlike centralized finance today, DeFi

uses peer-to-peer transactions without any middlemen being involved. Cryptocurrency and blockchain are the main technology used in DeFi. Transactions made are recorded in a public ledger as an identical copy, in the same blockchain in an encrypted node. Compared to centralized finance, DeFi is much safer and more transparent. They use private keys to access and secure an account and its funds. The middlemen are been replaced by smart contracts in DeFi. Smart contracts are a piece of code or software, which acts as a middleman between a sender and a receiver. These pieces of codes are stored in the blockchain in a decentralized network. This smart contract controls the execution of the transaction and makes them traceable and irreversible.

Most of the popular existing apps in web2 have an equivalent alternative in web3 like Metamask for Paypal, ENS(Ethereum Name System) for DNS(Domain Name System), Minds for Facebook, Aether for Reddit, Filecoin for Gdrive, LBRY for Youtube, Status for Messenger, etc. P2P networks can be used to create decentralized applications that are resistant to censorship and control by centralized entities. A decentralized social media platform could use a P2P network to store and distribute user-generated content, allowing users to maintain control over their data and interactions.

These P2P nodes in the network communicate directly with each other without relying on centralized servers, which can improve network efficiency and reduce the risk of censorship or single points of failure. The web3 frameworks make it much more secure and reliable. These Web3 frameworks are an important component of the decentralized web, providing developers with the necessary infrastructure for creating blockchain-based applications. These frameworks, such as Ethereum, Polkadot, and Cosmos, etc provide a set of tools and interfaces for building smart contracts, deploying decentralized apps, and interacting with the blockchain. Developers can use these frameworks to create applications that are decentralized, transparent, and secure.

In addition to DeFi, web3 technology can be used for a wide range of applications, including gaming, supply chain management, and identity verification. Platforms like decentralized gaming can use web3 technology to enable players to trade in-game assets with each other, without the need for a central authority. Supply chain management systems can use web3 to track the movement of goods and ensure transparency and accountability in the supply chain. Identity verification systems can use web3 to provide secure and verifiable identity credentials, without the need for centralized authorities. Thus, the implementation of web3 technology has the potential to revolutionize the way we interact with the internet and each other, by enabling decentralized, transparent, and secure applications and services. More and more businesses and organizations are looking to integrate this technology with their existing systems. One of the most common ways to integrate Web3 with existing systems is through the use of APIs (Application Programming Interfaces).

APIs allow different systems to communicate with each other, which is essential when integrating Web3 technology with existing systems. By creating APIs that can interface with Web3-based applications, businesses and organizations can leverage the benefits of blockchain technology without having to completely overhaul their existing systems. Another way to integrate Web3 with existing systems is through the use of middleware. Middleware acts as a bridge between different systems, allowing them to communicate with each other seamlessly. For Web3 integration, middleware can be used to connect existing systems with blockchain networks, such as Ethereum, allowing for the execution of smart contracts and other blockchain-based transactions.

It is important to note that integrating Web3 with existing systems can be a complex process and requires a thorough understanding of both the existing system and the Web3 technology being used. It may also require changes to be made to the existing system to accommodate the integration. implementing Web3 technology can bring numerous benefits to businesses and organizations. It can provide increased security, transparency, and efficiency, while also enabling new use cases such as decentralized finance, digital identity management, supply chain management, and more.

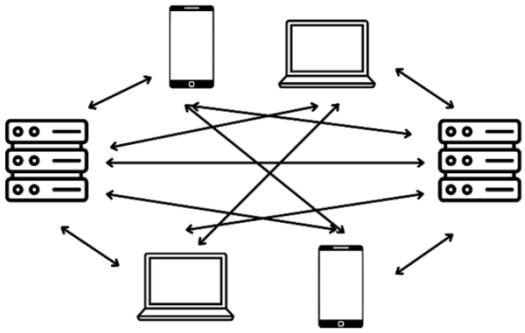

Figure 1 P2P in Decentralized Network

IV.WEB 3.0 PROTOCOLS AND STANDARDS

Web3 protocols are a set of rules and guidelines that govern the operation of dApps on the Web3 network. One of the most important web3 protocols is the Ethereum Virtual Machine (EVM). The Ethereum Virtual Machine (EVM) is a critical component of the Web3 network, as it provides a standardized runtime environment for executing smart contracts and dApps. The EVM is an emulation of a Turing-complete virtual machine that can execute any arbitrary code, making it highly versatile and flexible. One of the key features of the EVM is its ability to ensure that smart contracts and dApps run in a deterministic manner.

Determinism means that the same input will always produce the same output, regardless of the machine or platform used to execute it. This is important for smart contracts and dApps, as it ensures that their behavior is predictable and transparent, providing trust and security to users. The EVM achieves determinism through its use of a consensus algorithm called Proof of Work (PoW). PoW requires miners to solve a mathematical puzzle in order to add a block to the blockchain. This puzzle serves as a way to establish consensus among network nodes, ensuring that all nodes have the same view of the blockchain. This consensus mechanism ensures that all nodes agree on the state of the blockchain, which in turn ensures that smart contracts and dApps execute in a deterministic manner.

Another important feature of the EVM is its use of the Solidity programming language. Solidity is a high-level programming language that is specifically designed for writing smart contracts and dApps on the Ethereum network. Solidity is similar to JavaScript in syntax, making it easy for developers to learn and use. The EVM also includes a gas system, which is used to pay for the execution of smart contracts and dApps. Gas is a measure of computational effort, and the amount of gas required for a transaction or smart contract execution depends on the complexity of the task. Gas ensures that the network is not overwhelmed by expensive or malicious code, as users must pay for the computational resources they use. Another important web3 protocol is the IPFS.

The Inter Planetary File System (IPFS) is a critical protocol in the Web3 network that addresses the need for decentralized file storage and sharing. IPFS enables users to store and share files in a decentralized and peer-to-peer manner, allowing for greater security, privacy, and accessibility compared to traditional centralized file storage systems. IPFS is designed to overcome some of the limitations of the traditional client-server model of file sharing. In the client-server model, files are stored on a central server and accessed by clients over the internet. This model is highly centralized and prone to censorship, as the server owner has complete control over the files and can restrict access or remove them at any time.

It is also vulnerable to security breaches, as a hacker who gains access to the server can potentially steal or modify all the files stored on it. It is a distributed and decentralized file storage system that operates on a peer-to-peer network. Files are broken down into smaller pieces and stored on multiple nodes in the network, making them highly redundant and resistant to censorship or data loss. When a user requests a file on IPFS, the network retrieves the file from multiple nodes, ensuring that it is available even if some nodes are offline or unreachable. IPFS is important for Web3 because it allows dApps to store and access data in a decentralized manner, which is a fundamental aspect of a decentralized internet. With IPFS, dApps can store data on a distributed network rather than relying on centralized servers, which enhances their security, privacy, and accessibility. This also allows for greater innovation in dApp development, as developers can access and use data from the IPFS network in a decentralized and secure manner.

Web3 standards are also important for the interoperability of dApps across different blockchain platforms. One such standard is the ERC (Ethereum Request for Comment) series of standards, which

define the rules and guidelines for the creation and use of tokens on the Ethereum network. ERC20 is one of the most widely used ERC standards, and it defines a set of rules for creating fungible tokens on the Ethereum network. Web3 standards include the Web3.js library, which provides a JavaScript interface for interacting with the Ethereum network, and the JSON-RPC (Remote Procedure Call) standard, which defines a set of rules for how dApps communicate with the Ethereum network.

The Web3.js library is a JavaScript library that provides an interface for developers to interact with the Ethereum network. The library allows developers to write code in JavaScript that can communicate with the Ethereum network using the JSON-RPC standard. Web3.js provides a wide range of functions that enable developers to perform various tasks on the Ethereum network such as sending transactions, retrieving account information, and interacting with smart contracts.

The main protocol which is used is JSON-RPC standard for how dApps communicate with the Ethereum network. JSON-RPC stands for JavaScript Object Notation Remote Procedure Call. The standard defines a set of rules for how JSON objects are sent and received over HTTP or IPC protocols. This standard enables dApps to communicate with the Ethereum network in a standardized way, regardless of the programming language or framework being used. The JSON-RPC standard is used extensively by dApps that interact with the Ethereum network. It provides a flexible and extensible framework for building decentralized applications that can communicate with the Ethereum network. The standard is actively maintained by the Ethereum Foundation and has been widely adopted by the blockchain community.

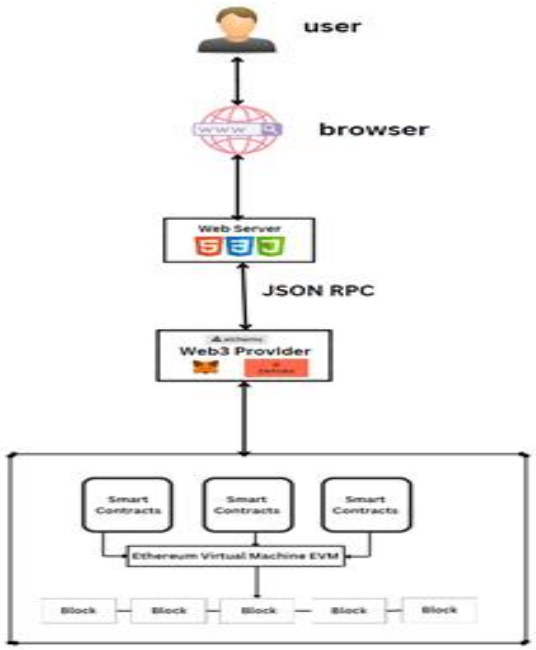

Figure 2: Ethereum Blockchain

Apart from this, ENS (Ethereum Name Service) is a decentralized naming system built on top of the Ethereum blockchain. It provides a way for users to register human-readable domain names and associate them with Ethereum addresses, smart contracts, and other resources on the blockchain. In this paper, we will explore the workings of ENS and its importance in the Ethereum ecosystem. The ENS architecture is based on a set of smart contracts deployed on the Ethereum blockchain. These smart contracts define the rules for registering and managing domain names, as well as the mapping between domain names and Ethereum addresses. At the heart of the ENS architecture is the ENS Registry, a smart contract that acts as a global registry for all domain names on the system. Each domain name is represented by a unique hash value that is stored on the ENS Registry contract.

When a user registers a domain name, they submit a transaction to the ENS Registry contract, which stores the domain name hash and associates it with the user's Ethereum address. The ENS Registry also includes a resolver contract that is responsible for mapping domain names to Ethereum addresses or other resources on the blockchain. When a user queries a domain name, the ENS resolver looks up the associated Ethereum address or resource and returns it to the user. The resolver contract can also be updated to support new types of resources, such as IP addresses or other metadata. Combining all these protocols and standards in ERC, allows

developers to create complex applications that can interact with the Ethereum network in a consistent and user-friendly way. These protocols and standards are likely to play a vital role in development of decentralized applications.

V.Web 3.0 Pros And Cons

Everything that humans invented isn't flawless. This technology web3.0 has its own advantages and disadvantages too. One of the most important merits of Web 3.0 is the decentralization of data and privacy. The user has ownership of their data on the internet. You don't need middlemen to access your data, since web3.0 enables users to track down their data. Then, in web2, one of the most common problems among users is the interruption of services. In web3, users will not need to think about that, since data are in distributed nodes. Users need not worry about the security of their data since web3 uses blockchain technology, which is hard to tamper with or alter the data.

The applications (Dapps) in web3 are too smart, reliable, and efficient as well. On the advertising side, sellers are more understanding of the need of customers and can display the services and products you are interested in with the help of Artificial intelligence(AI). More importantly, web3 lets users shift the power from the tech giants to the users. This can lead to faster transaction times and lower costs for users. Web 3.0 also has the potential to increase accessibility for users. With Web 2.0, many users are excluded from participating in online services due to geographical or socio-economic barriers. A number of applications are developed using Web 2.0 like virtual reality, etc, but has various limitations. With Web 3.0, users have equal access to decentralized applications and services, regardless of their location or financial status.

Even though web 3.0 has more merits compared to web2 and itself, it has its demerits too. Web3 is way too technical for a normal internet user or a non-technical guy to understand and use it. If a normal user is here to surf the internet, it is not necessary to learn all those concepts. Some technologies need advanced skills to be operated in web3. When it comes to Dapps, it should be simple as one or two clicks like in web2, rather than being technical, and the long seed phrase to be memorized instead of passwords might be difficult for a normal user.

And in DeFi, if a user lost his/her private keys, he/she loses access to his/her account and funds, and due to blockchain technology, payments may take time to proceed, which might be inconvenient for normal users. And user's personal and public data are easily accessible since Web3 is huge and interconnected, so it is easier for anyone to gain access to the public and private data that you share online. Mainly, the devices are not advanced that much, which can be able to deal with web3. The existing websites will be forced to upgrade themselves to the latest technology, which might lead to a loss in their market value. These are some of the major merits and demerits of web3.0.

VI.CONCLUSION

Web 3.0 presents both advantages and challenges. While it offers greater privacy and decentralization of data, as well as more efficient and reliable applications, it can also be too technical for some users and present security risks. It also represents a significant step forward in the evolution of the internet, and its benefits have the potential to transform the way we interact with each other. Additionally, the lack of advanced devices and potential loss of market value for existing companies may slow the adoption of Web 3.0. It is important for developers and businesses to carefully consider these challenges and work to address them in order to ensure the widespread adoption and success of Web 3.0.

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