Blockchain Technology for Web 3.0

Abstract:

Many of us know that Blockchain is a technology behind the bitcoin, bitcoin uses the Blockchain to track transactions, but Blockchain has many more use cases. To understand how one needs to understand what Blockchain is. So, to answer it, Blockchain is a decentralized block of connected data, forming a distributed network. Every block has data, its fingerprint called hash [unique across the network], and the hash of its next node. The data stored on the blocks are immutable or cannot be tampered and trying to tamper a data on the block can lead to an invalid block as data change leads to a hash value change making it weak from the linking node. The partnerships that store the data allow us to use Blockchain technology in healthcare to keep the patient's record, to store user public and private documents like mark cards or can store documents related to the assets they own and many more. But the decentralized nature of Blockchain Technology revolutionizes the Internet by giving birth to Web 3.0 as we are in the era of Web 2.0, where the user data is owned by companies like Facebook, Amazon, Google, YouTube, and some of the AI-based tech giants. They have complete control over the user data. With Web 3.0, users are the owner of their data and have all the right to control it. As we go along this term paper, we will discuss the use cases, advantages, and disadvantages involved with Web 3.0.

History of Web 3.0:

The Internet was invented around 1990. When the Internet was first invented, we just had static pages, and these web pages were referred to as "the read-only web". Users had no options to interact with the Internet. As this was the very first version referred to as Web.0. There were very few applications. Additionally, Users struggled to find valuable content as there was no algorithm to search through the pages.

With the evolution of the scripting frameworks, the Internet revolutionized as Web 2.0, in 2004, the first application using the scripting language was released and resolved most of the problems associated with Web 1.0, allowing users to interact and search through the Internet, and these web pages were referred as "the read-write web". When users started writing data on to Internet, this opened the door to many social media applications and these applications started gathering user data and selling it for targeted advertisement. Currently, the user data is highly centralized with big technologies like Meta, YouTube, Google, and Twitter now owning most of the user data and use for advertisements and personal gains.

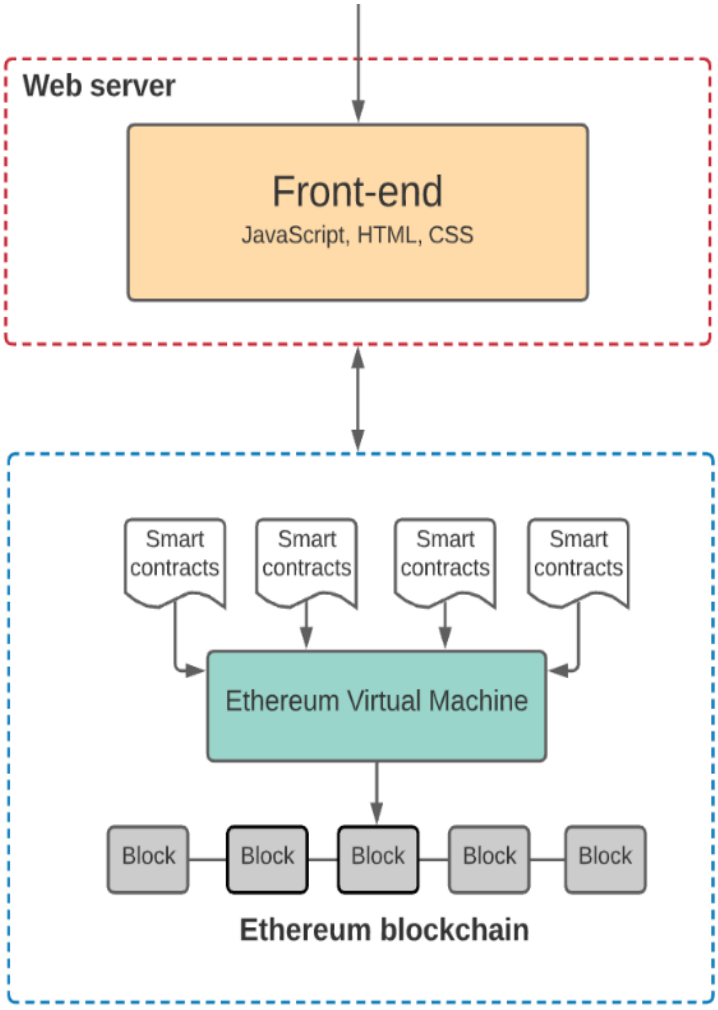
With evolving blockchain technology, AI, and ML, Web 3.0 is being researched and developed. Blockchain technology helps to encrypt and protect the user data posted to the Internet and thereby prevents large companies from using it for their gains. The decentralization nature of Blockchain allows users to connect with their data and own it. So, Web 3.0 is termed "the read-write-own web".

How Web 3.0 Works?

The main idea of web 3.0 is to make the search and browsing faster by securing user data.

Web 2.0 Applications currently have middleware to run the logic and database layer to save the data. The application server and database server are centralized. Unlike Web 2.0 the server and

DB are not centralized instead Web 3.0 leverage the Blockchain to build the app on decentralized nodes.
The architecture of Web 3.0 consists of 4 components, namely Ethereum Blockchain, Smart Contracts, Ethereum Virtual Machine (EVM), Front End.



Ethereum Blockchain – it consists of peer-to-peer connected nodes [blocks], and anyone can write their data to these nodes. As these nodes are decentralized, they won't be owned by a single entity but instead distributed over the Blockchain.

Smart Contracts – these will be the programs that run on the Ethereum blockchain and has the logic to execute on change of nodes.

Ethereum Virtual Machine (EVM) – these are the machines in which the logic behind state contracts gets executed.

Front End – these will be the UI pages to interact with the business user.

When the user interacts with the UI of an application, the data used for searching or browsing will get added to the nodes by hashing, and the smart contract associated with these nodes will be executed on EVM and returns the required data.

Use cases of Web - 3.0:

Some Of the famous use cases of Web 3.0 are:

Metaverse - Metaverse was on the headline during 2021 and at the beginning of 2022. Even Facebook rebranded itself as Meta and started investing billions in developing Metaverse.
Metaverses are a digital representation of the real world. It is also referred to as a virtual world one can use AR/VR to feel these virtual worlds and interact with people virtually as they can interact in real life. Web 3.0 proposes the fully decentralized, interoperable metaverse version

Decentralized finance (Defi) - Defi offers crypto users an ability to invest, lend, and trade the crypto assets. There were many issues related to security that involved scamming users, with Web 3.0 such cases can be reduced as the actual user information is encrypted as digital profile.

Decentralized Autonomous Organizations [DAOs] – DAO is also believed to happen with Web 3.0, where there won't be organization with Board/CEOs controlling the entire organization. Instead, the organization will be democratized and will be governed by users with tokens that get added to user wallets for using organization products.

Cryptocurrency - Cryptocurrencies uses Web 3.0 to create a new world of digital currencies that are easily accessible from any location. With the cryptocurrencies one can reduce the hassles associated with traditional banking system.
Decentralized applications (dApps) – unlike traditional application, dApps uses Web 3.0 to run on decentralize distributed network and have a smart contract which are executed in Ethereum virtual machines.

Existing Application Using Web 3.0:
Web 3.0 is already in use and is being developed and researched. Below are some examples that are already using Web 3.0 –

Siri – Previously Siri use to serve simple tasks like reminders and directions, with the use of web 3.0, sharing information through the linked block allows Siri to respond to a wide variety of questions from its user.

IDEX – IDEX is a decentralized platform used for trading crypto tokens, it allows purchasing of other tokens using Ethereum, so one needs to have an Ethereum Wallet to trade.
e-Chat is a Secure messenger that uses Decentralized Blockchain to help connect people. Users can share the information without fear of information theft, this application is now available for download in the stores.

LBRY – is a decentralized digital library with video and music content, it uses blockchain technology to publish materials.

Advantages of Web – 3.0:

1. As the user data will be encrypted using the SSH-256 hashing technique, user information is secured and protected, no company can access their data without user permission.
2. Decentralization allows users to browse all the websites and Government entities won't be able to restrict users from visiting any sites.
3. As the data is distributed across multiple nodes, the User can access them all the time and avoids the issues one faces in server failure in Web 2.0
4. Web 3.0 creates the digital profile for each user and thereby one does not have to create a profile for each application.

Disadvantages of Web - 3.0:

1. Not All devices would be compatible to run the Web 3.0, some of the older devices need to extend and enhance their specification to adapt to Web 3.0, so considering the current state of devices only a few groups of people will be able to use Web 3.0.
2. As Web 3.0 will be the combination of Blockchain, AI, and ML and it will be the combination of older and newer technologies and making it difficult for people to understand, people would be hesitant to adopt Web 3.0.
3. If Web 3.0 gets adopted full-fledged, the application using Web 3.0 won't be able to update to newer technologies thereby losing its viewers.
4. As Web 3.0 uses blockchain technology and nodes are connected in a peer-to-peer manner, any change needs to be updated to all the nodes or nodes need to be forked if the update is rejected.

Conclusion:

In this above study, we reviewed how Web technology evolved from Web 1.0 to Web 3.0 over time, how Web 3.0 works, its use cases, a few existing applications, and its advantages and disadvantages. In conclusion, Web 3.0 is in the earlier stage of development and research. Web 3.0 with Blockchain and decentralized network will help users to own their data and have complete control over it, thereby it reduces the monotony that we have with Web 2.0. As the development of Web 3.0 evolves, the current disadvantages will be addressed over time.

References:

Rudman, R.; Bruwer, R. Defining Web 3.0: Opportunities and challenges. Electron. Libr. 2016, 34. [Google Scholar] [CrossRef]

Debit, N. What is Web3? The Decentralized Internet of the Future Explained. Free Code Camp. 8 September 2021