

DECENTRALIZATION USING BLOCKCHAIN

Tanvi Panjari

*Masters Of Science in
Computer Science Student
Chikitsak Samuha's Sir Sitaram
& Lady Shantabai Patkar
College of Arts & Science and
V.P. Varde College of
Commerce &
Economics, Mumbai
Email:tanvipanjari06@gmail.com*

Abstract— In blockchain, decentralization refers to the transfer of control and decision-making from a centralized entity (individual, organization, or group thereof) to a distributed network. Decentralized networks strive to reduce the level of trust that participants must place in one another, and deter their ability to exert authority or control over one another in ways that degrade the functionality of the network.

When building a technology solution, three primary network architectures are typically considered: centralized, distributed, and decentralized. While blockchain technologies often make use of decentralized networks, a blockchain application itself cannot be categorized simply as being decentralized or not. Rather, decentralization is a sliding scale and should be applied to all aspects of a blockchain application. By decentralizing the management of and access to resources in an application, greater and fairer service can be achieved.

Key Words: Decentralization; Blockchain; ethereum; transaction; centralization; Bitcoin; Ether

I.INTRODUCTION

A blockchain is a distributed database or ledger shared among a computer network's nodes. They are best known for their crucial role in cryptocurrency systems for maintaining a secure and decentralized record of transactions, but they are not limited to cryptocurrency uses. Blockchains can be used to make data in any industry immutable—the term used to describe the inability to be altered.

Because there is no way to change a block, the only trust needed is at the point where a user or program enters data. This aspect reduces the need for trusted third parties, which are usually auditors or other humans that add costs and make mistakes.[1]

Since Bitcoin's introduction in 2009, blockchain uses have exploded via the creation of various

cryptocurrencies, decentralized finance (DeFi) applications, non-fungible tokens (NFTs), and smart contracts.

You might be familiar with spreadsheets or databases. A blockchain is somewhat similar because it is a database where information is entered and stored. But the key difference between a traditional database or spreadsheet and a blockchain is how the data is structured and accessed.

A blockchain consists of programs called scripts that conduct the tasks you usually would in a database: Entering and accessing information and saving and storing it somewhere. A blockchain is distributed, which means multiple copies are saved on many machines, and they must all match for it to be valid.

The blockchain collects transaction information and enters it into a block, like a cell in a spreadsheet containing information. Once it is full, the information is run through an encryption algorithm, which creates a hexadecimal number called the hash.

The hash is then entered into the following block header and encrypted with the other information in the block. This creates a series of blocks that are chained together.[1]

1. What is decentralization?

Decentralization is the distribution of functions, control and information instead of centralizing them in a single entity. The term is used in numerous sectors and industries, from information technology to retail and government. It also denotes a system that has multiple paths for information to flow.

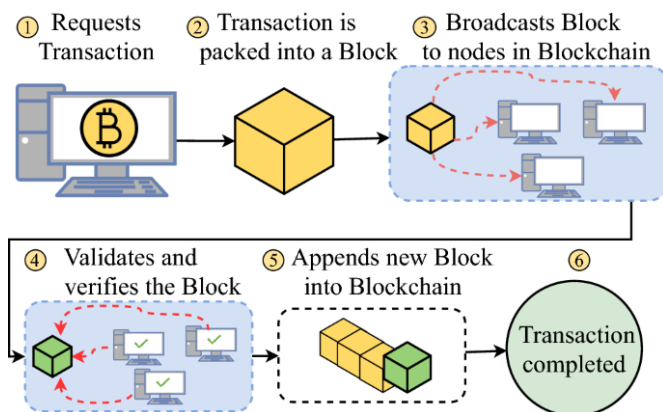
A centralized system is often known as a hub-and-spoke model, patterned after a bicycle wheel. Everything on the endpoints travels down the spokes to the hub, or central system. This is the essence of

the mainframe computer design. Whether it's a green terminal or a PC, they all connect into the mainframe, which creates a single point of vulnerability. If the hub (in this case, the mainframe) goes down, the entire network goes down and no work can be done.

The ultimate example of a decentralized network is the internet itself. When its predecessor, ARPANET, was built for the U.S. Defense Department in 1969, it was designed to survive a nuclear attack, so if one portion of the network went down, traffic would be rerouted through other parts of the network.

That design remains in operation to this day. Even though local outages are fairly frequent, it is virtually impossible to take down the entire internet.[3]

As seen on Fig. 1, where it demonstrates the overall Blockchain process. The process begins with the request of a transaction from a node, which would be packed into a block. It would then broadcast the block to other nodes within the Blockchain network for validation and verification. When that block has been successfully verified, it would then be appended at the end of the Blockchain to be stored and finally finishes the transaction.



2. Where did Decentralization Come From?

Many people must have curiosity regarding the reasons for the sudden growth in the popularity of blockchain technology and decentralization. Blockchain introduced the concept of peer-to-peer digital tools that can help in distributing power and information alongside opening new roads for collaboration. The benefits of decentralization blockchain depend on the peer-to-peer model, which takes away the authority of single or external powers.

Blockchain established the concept of running the network in accordance with a specific set of rules decided by the network members. You can notice how decentralization is an inherent trait of blockchain technology. As a matter of fact, the primary value proposition of blockchain technology involves better efficiency, equitability, and transparency in the exchange of value and information. Decentralization delivers the ideal foundation for the value benefits of blockchain, fuelling collaboration and removing centralized authorities.[2]

3. What is centralization and decentralization in blockchain?

Centralized and decentralized structures are polar opposites. A centralized structure implies control of the central entity by people who have the power to manage, control and oversee it. One example would be a nation's currency, which is managed by a central bank. Decentralization is the opposite of that, where no one person or entity owns, manages or controls the network or structure.

Not all cryptocurrencies are decentralized, although the most popular ones like Bitcoin and Ethereum's ETHER are. Unlike centralized currencies, decentralized cryptocurrencies are not regulated by central banks, but by their programming code and the monetary policies are regulated by their respective communities.[3]

II. WHY ARE BLOCKCHAINS DECENTRALIZED?

The main reason blockchains are decentralized is to avoid putting control in the hands of a few, or a country's central bank. That's the main motivation behind the embrace of cryptocurrency in the first place: to take banks out of the equation and have true peer-to-peer transactions.

Decentralized blockchains are designed to be unalterable, and once the data is entered it is irreversible. New data can be tacked on, but the old data can't be edited or changed in any way. For Bitcoin, this means transactions are permanently recorded and viewable by anyone. Think of it as feedback on eBay taken to the next level.

Not all digital currency is decentralized. There are also cryptocurrencies that use private, centralized systems, where only a select few people have the power to add new blocks and check the validity of transactions. These tend to be used in privacy-oriented industries like healthcare and finance.[3]

Is it necessary for a blockchain to be decentralized?

A controlled or decentralized blockchain is both possible. The phrases decentralized and dispersed, on the other hand, should not be used interchangeably.

A blockchain is naturally distributed (i.e., numerous parties hold copies of the data) but not decentralized. Permissionless or public blockchains and permission-based or private blockchains are the two sorts of blockchains.[2]

Because each node in the network has a complete record of every data published on the blockchain, public blockchains are now decentralized. Bitcoin is a popular example of a decentralized blockchain.

Private blockchains, on the other hand, are centralized. Because the network size is managed and the amount of access to nodes is controlled by a single organization.

Decentralization should be done only when it is necessary. It is not necessary for a blockchain application to be totally decentralized. Any blockchain solution must meet the needs of the user, which may or may not involve certain decentralization levels.

➤ **Types of decentralization in blockchain**

A blockchain usually exhibits one of the following levels of decentralization:

- Fully centralized. Entirely controlled and managed by a single, central authority.
- Semi-decentralized. Controlled and managed by multiple authorities.
- Fully decentralized. No middlemen or central authorities to manage or administer the network.

There are several subcategories of decentralization, including the following:

▪ **Political Decentralization in Blockchain**

The main entry among methods of decentralization in the blockchain would refer to business decentralization. It refers to the process of eliminating centralized and single-party processes through the use of smart contracts. Blockchain could eliminate the central party which takes control or ownership of all the data or assets of a business.[1]

Disintermediation, where two parties interact directly with each other, is a new trend in the world of business. Almost 5% of the blockchain use cases of businesses focus on business decentralization, with a priority on removing unwanted middlemen and centralized control.

▪ **Physical Decentralization in Blockchain**

The application of decentralization would also result in physical decentralization, i.e., the distribution of servers throughout the world. The efficiency of blockchain and decentralization would depend on how effectively the hardware can support them. You can achieve the benefits of decentralization blockchain only with a global tech infrastructure accessible to everyone without the control or ownership of no one.

Therefore, decentralization is possible only if main blockchain networks have more diverse groups of users operating the network nodes. The people are responsible for maintaining the network by verifying transactions and ensuring security through investment in high-end computing hardware receive equitable rewards on the network.

▪ **Decentralization of Transactions**

The decentralization of transactions is another notable entry among the methods of decentralization in blockchain, with examples like cryptocurrencies. Decentralization of transactions refers to B2B transactions with better transparency, trust, and efficiency. Blockchain has emerged as a powerful tool for reinventing value chains in the global economy by offering a new model for transactions.

Decentralization through blockchain helps in using a shared ledger featuring an immutable repository of transactions alongside the support of smart contracts. In addition, blockchain also ensures the facility of a consensus algorithm to ensure the execution, verification, and documentation of transactions in accordance with the rules of the network.

The cryptographic consent mechanism associated with the verified identity of network participants can lead to the trusted verification of transactions.

BENEFITS OF DECENTRALIZATION IN BLOCKCHAIN

Following are the advantages of decentralization –

Provides a trustless environment – No one has to know or trust anybody other in a decentralized blockchain network. In the form of a distributed ledger, each member of the network owns a copy of the exact same data. If a member's ledger is tampered with or corrupted in any manner, the majority of the network's members will reject it.

Increases the accuracy of data reconciliation – Companies frequently share information with their partners. This data is then changed and kept in each party's data silos, only to be resurfaced when it's time to transfer it downstream. Each time data is converted, the possibility of data loss or inaccurate data entering the workstream increases.

Points of vulnerability are reduced – Decentralization can help to mitigate sources of vulnerability in systems when single actors are overly reliant. Systemic failures might result from these flaws, such as the inability to provide promised services or inefficient service owing to resource exhaustion, recurrent outages, bottlenecks, a lack of appropriate incentives for effective service, or corruption.

Distributes resources more efficiently – Decentralization may also aid in resource distribution optimization, ensuring that promised services are delivered with improved performance and consistency, as well as a lower risk of catastrophic failure.

Transparent – Because decentralized blockchains are available to the public, they are transparent. The blockchain is open to everyone with an internet connection. Each participating node keeps a single copy of the data.

Full Control – With decentralization, the blockchain's members or users have complete authority over the activities. Because there is no central authority, all of the blockchain's data, control, and power are in the hands of its users.

Immutable – The data contained in a blockchain in a decentralized blockchain is nearly hard to alter.

Because each alteration must be confirmed by each node in the blockchain network, this is the case.

Secure – Decentralized blockchains are far more secure than centralized blockchains because they employ encryption to protect data. Furthermore, the data in the current block requires data from the preceding block to be cryptographically confirmed.[4]

CHALLENGES OF DECENTRALIZATION IN BLOCKCHAIN

Following are the disadvantages of decentralization –

Cost – In an organization, decentralization might be costlier than centralization. Because it necessitates the development of communication-automation systems and technologies.

Conflict – decentralization should only be employed when the consumers' needs are met. Because disputes might arise if users do not properly preserve decentralization.

Volatility – Cryptocurrencies built on a decentralized blockchain are extremely volatile. This is due to the fact that cryptocurrencies, or possibly the entire technology, are relatively new to the market. As a result, a large number of individuals are investing in them.

Crime – This is due to the fact that everything is done on the network anonymously, which might lead to exploitation or misuse.[4]

III.EXAMPLES OF A DECENTRALIZED BLOCKCHAIN

In addition to cryptocurrencies, decentralized blockchain applications (dApps) are a fast-growing sector in the blockchain space. DApps are applications that are developed on a blockchain ecosystem. They cover a variety of industries, including trading exchanges, finance and online games.

Ethereum, one of the oldest and most established blockchain platforms, has also been considered the most decentralized blockchain. as well as secure, immutable and permissionless.

Ethereum has recently migrated from the PoW consensus mechanism to proof of stake (PoS), which is more energy friendly. PoW requires significant computational effort to obtain the proof and can be expensive. PoS uses much less power and is reportedly

much faster than PoW. However, critics say the change has made Ethereum more centralized.[3]

IV. CONCLUSION

In this paper, decentralization using blockchain has been discussed. We got to know that Decentralized blockchains are designed to be unalterable, and once the data is entered it is irreversible. New data can be tacked on, but the old data can't be edited or changed in any way. For Bitcoin, this means transactions are permanently recorded and viewable by anyone. This paper listed the various benefits and challenges while decentralizing the blockchain. Also the example of blockchain environment which using decentralization method. We learned that A controlled or decentralized blockchain is both possible. The phrases decentralized and dispersed, on the other hand, should not be used interchangeably.

V. REFERENCES

- [1] <https://101blockchains.com/decentralization-in-blockchain/>
- [2] <https://www.investopedia.com/terms/b/blockchain.asp>
- [3] <https://www.techtarget.com/searchcio/definition/blockchain-decentralization#:~:text=Decentralized%20blockchains%20are%20designed%20to,recorded%20and%20viewable%20by%20anyone>
- [4] <https://www.tutorialspoint.com/what-is-decentralization-in-blockchain>
- [5] <https://www.techtarget.com/searchcio/definition/blockchain-decentralization#:~:text=Decentralized%20blockchains%20are%20designed%20to,recorded%20and%20viewable%20by%20anyone>