

# Blockchain for Decentralization

Komal Pardeshi<sup>1</sup> Dr. Sharada K. A.<sup>2</sup>

<sup>1</sup>Research Scholar <sup>2</sup>Associate Professor

<sup>1,2</sup>Department of Computer Science and Engineering

<sup>1,2</sup>HKBK College of Engineering Bangalore, India

**Abstract**— Blockchain is an emerging technology, based on decentralization. Centralized system has a drawback of single point of failure as control is given to a single machine. Decentralization exists with distributed system. In distributed system numbers of nodes which are located at different locations are connected with each other via communication network. In Decentralization there is no central-entity, the basic idea is to distribute control and authority to various nodes involved in the network, instead of a single node. Decentralization provides trustless environment means it is not necessary to know or trust anyone else in the network. Each member in the network has same copy of data in the form of distributed ledger. The objective of this paper is to introduce with various blockchain schemes for decentralization, level of decentralization. This paper also discusses about online money transfer system using blockchain.

**Keywords:** Blockchain, Decentralization, Disintermediation, Contest-Driven Decentralization, Online Money Transfer System

## I. INTRODUCTION

The motivation behind blockchain technology is to maintain consistency, availability, and operability of a distributed ledger without depending on any central authority (Peter Zhou, 2020). Data is an important part of communication. Nowadays digital information is an advance example of data. Blockchain is a distributed database which stores list of transactions. This list is continuously increasing. It is better than traditional database. For doing a transaction using central authority, we need to rely on centralized authority. We cannot trust this centralized authority because it can manipulate data or it may be hacked. So moving from centralized authority to decentralized network which contains ledger which is shared among all in the network is called decentralization (Imran Bashir, 2018). Decentralization ensures trustless environment. There is no need to trust anyone in the network. Each node in the network has exact same copy of data in the form of distributed ledger. If the ledger with any node is altered then it is rejected by majority of the nodes in the network. Decentralization improves data recovery. By having a decentralized data store, every node has access to real-time, shared view of data. Decentralization optimizes the resource distribution and helps to get better performance and consistency. Decentralized blockchain basically focuses on security over performance. When number of nodes increases in the network, it becomes more secure but performance drops down as the node must validate all the data being added to the ledger (Amazon Web Services, 2022). Decentralized systems are more fault-tolerant, attack-resistant, and collusion-resistant than centralized systems. Initially the World wide Web was developed as decentralized platform. Bitcoin and ethereum are blockchain technologies which are examples of decentralized architecture. Web 1.0

was the first version of the dial-up web which consists of static web pages. Web 2.0 is web of applications which is faster than Web 1.0 along with this Web 2.0 is more interconnected, social, and interactive. Web 2.0 allows people to communicate and exchange information globally. Web 2.0 is centralized services, information stored on private servers that can't interoperate efficiently and are susceptible to breaches (Mally Anderson, 2019). As more than half of the world is using internet so decentralization is necessary for security purpose.

## II. METHODS OF DECENTRALIZATION

One of the advantages provided by blockchain technology is decentralization. Anyone in the network can compete to become a decision maker. This competition is governed by consensus mechanism and the most commonly used consensus mechanism is Proof of Work (PoW). There are two methods to achieve decentralization. First is disintermediation and second is competition also called as Contest-driven decentralization (Imran Bashir, 2018).

### A. Disintermediation

Suppose a friend A wish to send money to friend B who is in another country. Then friend A will go to the bank and will transfer money to the bank in that country. Here bank maintains central database that is updated and confirming that A has sent money. With Blockchain technology, it is possible to send money directly to friend B without the need for a bank. It requires only the address of friend B on the blockchain. Thus, the intermediary bank is not required and decentralization is achieved via disintermediation (Imran Bashir, 2018). Disintermediation refers to "the power of removing intermediaries in the distribution network" (Gaur, 2020), which means transferring power from suppliers to consumers by establishing a direct relationship between the producers and end users via a blockchain platform (Tan ,et.al 2021). Thus, the disintermediation role of blockchain technology is expected to reduce costs, reduce inefficiencies, and increase data security (Chang et al., 2019).

### B. Contest-Driven Decentralization

As different service providers compete in order to select for provision of services by the system, so this method involves competition. Contest-driven method does not achieve complete decentralization, but up to certain extent it ensures that an intermediary is not take over the service. In blockchain technology, using a smart contract it is possible to choose an external service provider among large number of providers based on their reputation, reviews, previous score and quality of service (Imran Bashir, 2018). Thus by deciding certain criteria and using smart contract it is possible to choose service provider. In this way there is a competition among service providers where they compete with each other to become a service provider of choice.

### III. LEVELS OF DECENTRALIZATION

Decentralization should be applied where it makes sense (Amazon Web Services, 2022). There are three levels of decentralization they are, fully centralized, semi decentralized, fully decentralized (Imran Bashir, 2018). Fully centralized is maintained and controlled by central entity for example enterprise resource planning system. Semi decentralized is also known as distributed, where data is spread across multiple data centers and intermediary competes with each other to win a contract, for example multiple service providers compete to win a contract. In Fully decentralized system no intermediary are required. Here resources are owned and shared by all nodes in the network. Each node has exact same copy of distributed ledger. It requires consensus mechanism. In fully decentralization, security increases and performance decreases as number of nodes increases. Example of fully decentralization is bitcoin (Imran Bashir, 2018, Amazon Web Services, 2022). There are four levels of decentralization (Will Murphy, 2018) First is Technical decentralization, according to (Will Murphy, 2018) the data storage and data processing are not on the same server. Second Level is Governance decentralization which has two different types that are lower level and higher level. Lower level governance protocols are the Meta rules for how to govern the chain itself. These should be traditional and slow moving. The higher level governance protocol decides who can be in the ecosystem, how they can be compensated. Third level is Business decentralization (Will Murphy, 2018) presented an idea that, different companies may combine and bring together ownership of blockchain nodes that create the potential for more centralization that would concern others on the network. Companies can make their own agreements with customers that they don't share their blockchain nodes with other companies. Fourth level is state decentralization. The idea behind the state decentralization is to create different new independent server nations whose job is to maintain servers that are outside the authority of other nations, so that, data will be available though other nation takes down their internet (Will Murphy, 2018). The first decentralized blockchain application is Bitcoin cryptocurrency (Javad Zarrin,2020) which is most strong and secure blockchain(Imran Bashir, 2018) then Ethereum is most widely used decentralization tool which allows developers to write their business logic using smart contract (Javad Zarrin,2020)

### IV. MONEY TRANSFER SYSTEM

While designing a blockchain framework for decentralization one must consider parameters like what is being decentralized, what levels of decentralization is required which type of blockchain and security mechanism is used (Arvind Narayanan,2016). A decentralized system may be applicable where various independent authorities wish to maintain a centralized database (J.P. Morgan, 2018). First it needs to identify what system is being decentralized, then think about level of decentralization and which type of blockchain is suitable for the application. Finally decide how to achieve security of a decentralized system. Consider decentralized money transfer system, where the level of decentralization is disintermediation and security mechanism is atomicity. Expansion of internet and digitization increased the need the need for robust banking system. Now a day's everyone is using smart phones and everyone wished to move towards digitalization, in blockchain every block consists of timestamp, previous hash, nonce and merkle tree root. Block contains cryptographic hash of the data of the previous block. Every block inherits from the previous block, that is previous blocks has to create the current blocks hash. This technique makes the blockchain tamper proof and more secure. As shown in the figure 1 Sender initiates a transaction either by scanning Quick Response (QR) code or using contact number from their own mobile phone. Then user has to enter amount to be transfer. Once amount is entered that transaction is represented online as a digital block and it is broadcasted to all the nodes active in the network. All these nodes approve the transaction by validating all the information present in the block using consensus mechanism. Once the entire node approves the transaction the block is added to the chain. Once the block is added amount is debited from senders account and it is credited to receivers account and the transaction is committed. If nodes fail to approve the transaction then that block is not added into the network and transaction is aborted. Thus it ensures atomicity. The transaction is not approved if either sender's bank or receiver's bank is down. There may be discrepancy in receiver's information in such case also transaction is aborted. Thus it ensures security. Thus the online money transfer system uses cryptocurrency and blockchain technology to manage financial applications. "Bitcoin is the most popular and valuable cryptocurrency" (Jake Franken, 2022) Decentralized blockchain make the information safer, traceable and well organized.

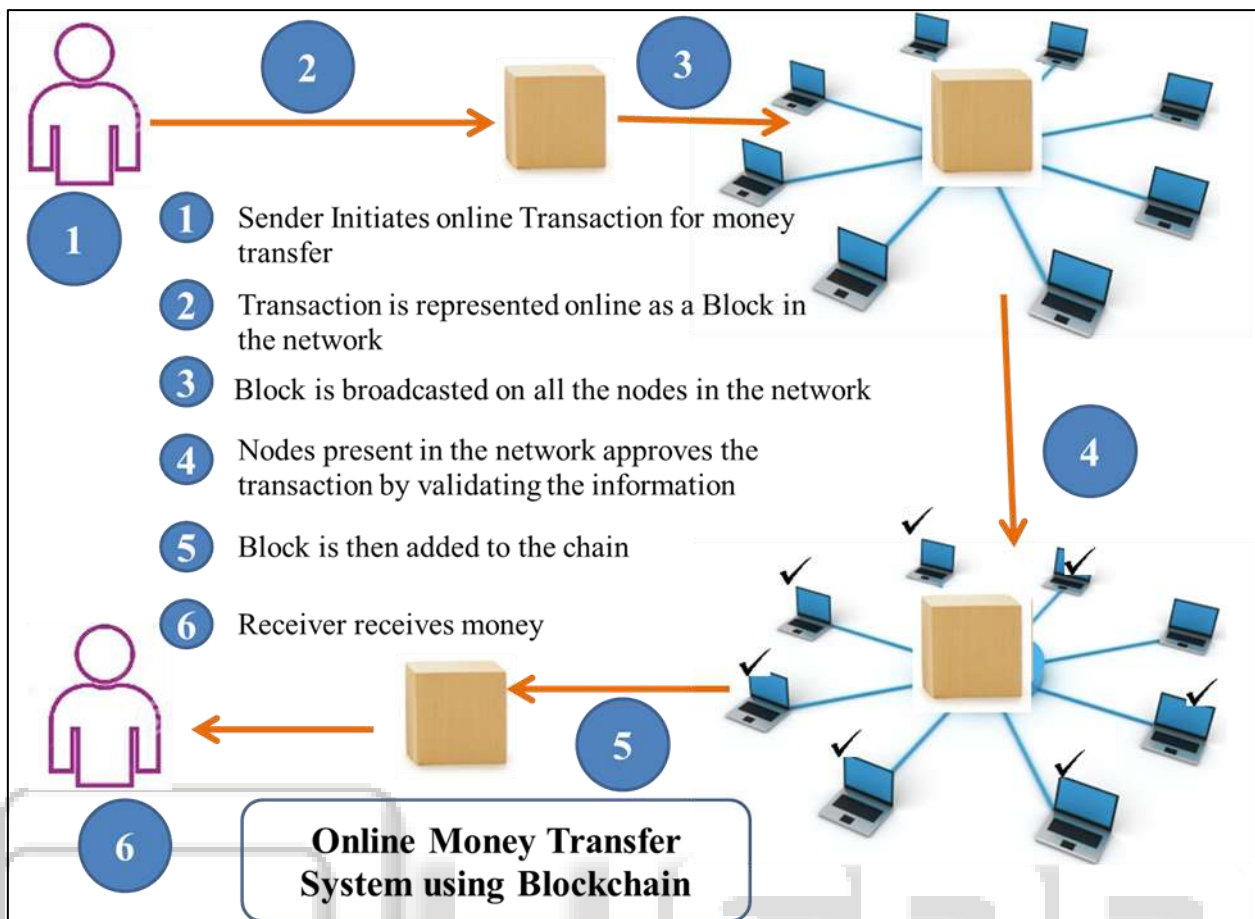


Fig. 1: Online Money Transfer System using Blockchain

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#### V. CONCLUSION

Blockchain main feature is its efficiency. As it uses distributed ledger technology, the online money transfer becomes easier as just by clicking send money gets transfer to receiver's account which reduces centralized communication of bank and unnecessary third party payment and no waiting time to transfer money is required. Thus Blockchain ensures security and reliability in an untrusted environment. Blockchain is not controlled by central authority but by the entire network of nodes who participated in the network using consensus mechanism. Blockchain data is secure and immutable. Blockchain cannot be applied everywhere. Not everything can or needs to be decentralized. Find the need of your system and then decide whether to use blockchain or not. Decentralization provides transparency, efficiency, reduced cost, security like features.

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