## Journal of Information Technology & Software Engineering

## The Decentralized Networks Implementing Blockchain Technology to Drive Security and Transparency

## Richard Nancy<sup>\*</sup>

Department of Electrical and Computer Engineering, Clarkson University, Potsdam, USA

## DESCRIPTION

The initial purpose of blockchain technology, which was developed in 2008 under the pseudonym Satoshi Nakamoto, is to facilitate the digital currency Bitcoin. But as time goes on, blockchain's potential is considerably exceeded that of cryptocurrencies, making it one of the most exciting technological developments of the 21st century. Essentially, blockchain depends upon Distributed Ledger Technology (DLT), a technology that allows data to be kept in a decentralized network among multiple computers. Every transaction or entry is kept in a block, which is then connected to other blocks chronologically to form a chain. Because the blockchain ledger is immutable, data entered into it cannot be removed or changed, providing security and transparency. The decentralized nature of blockchain technology is what makes it special. Blockchain depends on a network of participants, or nodes, to validate and record transactions, in contrast to traditional systems, which handle data by a single authority. Blockchain technology is made up of a number of essential parts that cooperate to safeguard its integrity and functionality.

A block is a set of data that usually consists of several transactions. Every block has the transaction data itself, a timestamp, and a reference (hash) to the block before it. The blocks are joined to form a chain in a chronological, linear order. By utilizing digital signatures to link each new block to the preceding one, a safe and verifiable chain of records is created. Computers or other devices that are a part of the blockchain network are called nodes. They cooperate to validate and confirm transactions and keep copies of the blockchain. Nodes in public blockchains are dispersed globally, guaranteeing the decentralized nature of the system. Blockchain networks utilize agreements as methods to reach mutual agreement over the legitimacy of transactions and verify that all blockchain copies are in sync with one another. The accepted methods that are most frequently used are Proof of Work (PoW) and Proof of Stake (PoS). Whereas validators in PoS are selected based on the quantity of bitcoins they possess, nodes in PoW validate transactions by solving intricate mathematical puzzles.

Blockchain protects data and maintains transaction integrity using cryptographic algorithms. To stop unwanted access and tampering, digital signatures, encryption, and hash functions are used. A blockchain functions as a decentralized database that is kept up to date by many users or nodes. A new transaction is broadcast to every node in the network as soon as it is started. Next, these nodes use an agreement-based system to confirm the transaction.

Developers compete to solve a challenging mathematical problem with PoW systems like Bitcoin. The first person to finish the puzzle adds the fresh block of transactions to the blockchain. People are chosen for Proof of Stake (PoS) systems such as Ethereum 2.0 based on the tokens they possess. After validation, the block will be added to the blockchain, signifying the completion of the transaction. After that, all nodes receive the updated blockchain, verifying that every participant has an identical copy of the record. Public blockchains are unrestricted networks in which anybody may join, approve transactions, and access the ledger. Ethereum and Bitcoin are two examples. Although completely decentralized, public blockchains may experience performance and scalability problems. Private blockchains are only accessible to selected users, frequently those who work for the same company. These blockchains are less decentralized than public ones, but they are more efficient and give more control. Two instances of private blockchains are Hyperledger and Corda. A consortium blockchain is managed by several companies, frequently belonging to the same sector. By offering efficiency and a degree of decentralization, it provides a halfway ground between public and private blockchains.

Hybrid blockchains give organizations the flexibility to manage access while still receiving the benefits of transparency by combining components of public and private networks. Blockchain technology is most commonly used in connection with cryptocurrencies such as Bitcoin, Ethereum, and Ripple. These virtual currencies depend on blockchain technology to provide safe and transparent transactions and function without the need for a central authority like a bank. Blockchain is perfect

Correspondence to: Richard Nancy, Department of Electrical and Computer Engineering, Clarkson University, Potsdam, USA, E-mail: richnan@CU.edu

Received: 21-Aug-2024, Manuscript No. JITSE-24-34192; Editor assigned: 23-Aug-2024, PreQC No. JITSE-24-34192 (PQ); Reviewed: 06-Sep-2024, QC No. JITSE-24-34192; Revised: 13-Sep-2024, Manuscript No. JITSE-24-34192 (R); Published: 20-Sep-2024, DOI: 10.35248/2165-7866.24.14.406

Citation: Nancy R (2024). The Decentralized Networks Implementing Blockchain Technology to Drive Security and Transparency. J Inform Tech Softw Eng. 14:406.

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for tracing things through the supply chain because of its transparency and immutability. Blockchain technology has the potential to decrease fraud, guarantee product quality, and increase efficiency by offering a permanent record of a product's route from manufacturer to consumer. Blockchain technology is an important development in data security, sharing, and storage. Decentralized systems provide many advantages, including as efficiency, security, and transparency. These benefits could change a variety of industries, from digital rights and supply chain management to healthcare and banking.