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A Study on the Fundamentals of Block-Chain Technology

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A B S T R A C T

The Block chain is basically decentralized technology and Block chain has distributed ledger that secure and transparent transactions without using central authority. mostly block chain developed for Bitcoin. Blockchain has initially used different applications in multiple industries like healthcare, finance, supply chain management. This paper presents a basic study of block chain Technology including basic block chain architecture, consensus mechanisms,and operation flow. This also gives real world applications.

Keywords:**Block-chain, Consensus Mechanisms,Smart Contract,Distributed Ledger, Bitcoin.**

I.Introduction

Block chain is decentralized and distributed technology that uses secure and transparent transactions without any central authority. Every time each transaction is verified by network participants and after that stored in a block in the block chain.newly created block is linked to the previous block. In this process the block chain used cartographic hashes.

Blockchain's decentralized nature, it reduces operational costs and also improves system efficiency.

II. Fundamental of Block chain

A. Definition

A block chain can be a sequence of blocks. Each containing transaction data a timestamp and cartographic hash of the previous block. This structure shows security and immutability.

B. Blockchain Key Features

i. Block Chain technology is Decentralized.

ii. All the transactions are visible to all network participants that its Transparency.

iii. Data cannot be updated, inserted and deleted once added in a block means its Immutability.

iv. Block chain is Secure for transaction.

III. The Blockchain Technology Architecture

In Block chain architecture used of multiple layers:

1. Data Layer in Blockchain:

The Data layer stores the all transaction block data and uses cartographic hashing. It can also be used in data structures, for example Merkle trees.

2.Network Layer in Blockchain:

The network layer uses peer-to-peer communication with all nodes and also allows them to validate transactions.

3. Consensus Layer in Blockchain

The Consensus layer is used to give consensus to users.

4. Application Layer in Block chain

The Application Layer used smart contracts and also used in decentralized

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IV. Working of Block chain

1. The working of block chain involves the following steps:

2. A transaction is first initialized.

3. The transaction is to the data in to network.

4. After that noes validate the transaction.
5. After that the new block is created.
6. After that block is added to the block chain.
7. The updated the distribute ledger .

V. Consensus Mechanism in Blockchain

Consensus mechanisms are used to maintain consistency across the network.

1. Proof of Work: POW consensus is to select a miner to add the next block in the block chain. mostly Bitcoin uses the POW consensus algorithm. It also used to solve complex mathematical problems.

2. Proof of Stake: POS consensus is most common and alternative to POS.

3. Proof-of-Elapsed Time:POET It is widely used in permission Blockchain networks.

4. PBFT: PBFT provides fast consensus in permissioned networks.

VI. Applications of Block chain

Block chain technology mostly used in:

1. Finance: in the Finance used Cryptocurrencies online payment.
2. Healthcare: securely store patient medical records.
3. Supply Chain: easily tracking the product.
4. Voting System : Tamper-proof and secure elections.

VII. Challenges and Limitations

The advantages and several challenges.

1. Scalability issues.
2. High energy consumption.
3. Privacy concerns.
4. Regulatory uncertainty.
5. Lack of interoperability.

VIII. Future Scope

Future developments in blockchain include:

1. It is Faster and secure.
2. It is used in faster and secure transactions.
3. It is used in online transactions.
4. It is a digital currency.

IX. Conclusion

Blockchain technology offers a secure, transparent, decentralized and digital transaction. It can eliminate third parties. So we can directly communicate with a used peer to peer network. Blockchain is to play an Important role in the upcoming year of digital systems.

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