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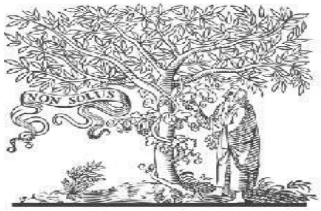

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Title **IMPROVING SCALABILITY USING BLOCKCHAIN IN BANKING SECTOR**

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Paper Authors
Dr. Siva Rama Krishna.K, Vidya Sagar. K, Mahaboob Subhani.SK

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Improving Scalability Using Blockchain in Banking Sector

Dr. Siva Rama Krishna.K[1], Associate Professor, Department of Computer Science and Engineering, ALIET, Vijayawada.
sivaramkosuru@gmail.com
Vidya Sagar. K[2], IV B.Tech Department of Computer Science and Engineering, ALIET, JNTUK, Vijayawada.
Mahaboob Subhani.SK[3], IV B.Tech Department of Computer Science and Engineering, ALIET, JNTUK, Vijayawada.

Abstract
The Blockchain is an encrypted database that is distributed across numerous computers and serves as a virtual record of transactions and contracts. This technology supports bitcoin transactions and has already upended the financial industry. Since blockchain technology has the potential to improve data security, provide a decentralized and transparent network, and lower operational costs, the goal of this study is to examine how it can affect the financial industry. Blockchain's extraordinary properties make it a potential technology for determining the financial sector's future despite its limits.

Blockchain technology makes sure that payments are made autonomously and transparently, preventing any fraudulent activity.

Keywords: Blockchain ; Decentralized; Smart contract;

Introduction

Blockchain technology is a decentralized peer-to-peer network composed of a series of blocks, hence its named as blockchain. Satoshi Nakamoto first developed and implemented this concept in Bitcoin, and it has since piqued the interest of researchers, with its characteristics increasing its applicability. Blockchain is also known as distributed ledger technology, which preserves the calculation of all nodes in each block, ensuring that the ledger is shared and reliable within the network. Additionally, each block contains a unique and unchangeable value called a hash code, which is derived using a complex mathematical hash function, ensuring immutability. Moreover, transparency is ensured by these reasons, and as transactions do not occur in the traditional manner with individual real user IDs and addresses, both the sender and receiver can remain anonymous. The absence of a central authority also makes the entire system somewhat autonomous . These factors have made blockchain an emerging technology that can be applied in various fields. The implementation of blockchain technology has the potential to eliminate unnecessary intermediaries, resulting in cheaper and more efficient services for both clients and financial institutions. The areas where banks and other financial organizations are likely to adopt blockchain include payment systems, customer identification, loan processing, and credit protection.

Literature Survey

A. The invention and significance of blockchain

Satoshi Nakamoto introduced a new method for peer-to-peer digital cash, using a cryptocurrency called Bitcoin. This was a significant development, as cryptocurrencies are not created or controlled by governments, and have their own set of rules to follow. This type of organization has given rise to the new blockchain technology, which forms the

basis for the growing number of authorized blockchain applications. Blockchain technology allows for the exchange of money without intermediaries, enabling people to send money directly and securely without any Although blockchain technology is relatively new, it has gained recognition as a potential solution that offers a notable edge for the transfer of assets in corporate networks.

It is one of the most promising and revolutionary inventions, attested to be as significant as the internet or electricity. Unfortunately, few people have heard of the technology, but significant social media coverage is helping to raise awareness. It is one of the most promising and positive new technologies for the coming era, an distributed ledger technology that underpins Bitcoin. It offers a new way to record, preserve, and transfer data, and what's even more incredible is the transparency and secure data that is auditable and resistant to tampering.

B. Blockchain as an underlying technology of Bitcoin

Blockchain is the underlying technology that powers Bitcoin, a digital currency that operates on a decentralized, peer-to-peer network. The blockchain serves as a public ledger that records all transactions made using Bitcoin, and it is maintained by a network of nodes that validate and verify the transactions. While Bitcoin is the most well-known use case for blockchain technology, it has the potential to revolutionize a wide range of industries by enabling secure, transparent, and efficient transactions without the need for intermediaries.

Background and Related Work

A. Working of blockchain

Blockchain technology has the potential to revolutionize our systems of trade, identity, and governance by increasing transparency. Every transaction that occurs is recorded in a distributed, immutable ledger, also known as a blockchain. This ledger is shared and stored in multiple locations, removing a single point of failure, and providing transparency across all participants. Once a transaction is agreed upon and attached using cryptography, it is nearly impossible to go back and change the past records.

To add a new transaction or make changes to the blockchain, the majority of nodes in the blockchain network must perform algorithms to validate and verify the information. If most nodes agree that the information and signature are legitimate, the new block is appended to the chain. This distributed consensus mechanism allows the blockchain to operate as a decentralized ledger without the requirement of a central authority.

Each block in the blockchain is formed by a page of transactions and is linked to the next through cryptographic hashing. Before adding a block to the chain, a cryptographic puzzle must be solved to create the block. The computer that solves the puzzle shares the solution with all other computers on the network, and this is called proof of work. The network then verifies the proof of work, and if it is correct, the block is added to the chain. This combination of sophisticated mathematical problems and verification by multiple computers guarantees the reliability of each block on the chain. By eliminating the need for a central authority, blockchain enables real-time direct interaction with data.

Blockchain technology can be classified into two categories:

1. Public Blockchain:

A public blockchain is a decentralized and transparent digital ledger that can be accessed by anyone on the internet. It is maintained by a distributed network of nodes that validate and verify

transactions using a consensus mechanism, which ensures the integrity and security of the network. Unlike a private blockchain, which is restricted to a specific group of participants, a public blockchain allows anyone to join the network, view the ledger, and participate in the validation process. This feature makes public blockchains ideal for applications that require transparency, accountability, and trust, such as cryptocurrencies, supply chain management, and voting systems. Examples of public blockchains include Bitcoin, Ethereum, and Litecoin.

2. Private Blockchain:

The concept of a private blockchain pertains to a distributed ledger technology that is purposefully designed for employment within a confined network of acknowledged participants, typically within a single organization or consortium.

In contrast to public blockchains that welcome anyone willing to join, private blockchains necessitate permission or authorization for network access and use. These blockchains provide numerous advantages such as heightened privacy, scalability, and governance, as well as lowered expenses and augmented efficiency. Nevertheless, they may confront obstacles like insufficient transparency, the likelihood of centralization, and restricted acceptance and compatibility with other blockchain networks.

B. Blockchain and Crypto-Currency are not the same thing.

Blockchain serves as the platform that facilitates the use of cryptocurrencies. It is the technology behind the distributed ledger that documents the network and enables the transfer of value and data.

Cryptocurrencies are the tokens used within blockchain networks to transact and pay for services. They can be seen as a tool or application of blockchain technology and can be used to digitize the value of assets.

While cryptocurrencies are an essential part of the ecosystem, blockchain serves as the underlying technology that enables their use. Transactions involving cryptocurrencies can only occur on a blockchain network, which provides a means to record and transfer them.

Methodology

A. Smart Contract

Blockchain technology can be used in the banking industry for transactions using smart contracts to automate and streamline the transaction process, increase efficiency, and reduce costs. Here's how it works:

Creation of smart contracts: Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. In the case of banking transactions, smart contracts are created using blockchain technology, and they can automatically execute when certain conditions are met.

Execution of transactions: Once a smart contract is created, the transaction can take place on the blockchain. The parties involved in the transaction will input their information and agree to the terms of the smart contract. Once the conditions of the contract are met, the smart contract will execute the transaction automatically, and the funds will be transferred from one party to another.

Security: The use of blockchain technology in banking transactions using smart contracts can provide a high level of security. Because blockchain transactions are recorded on a distributed ledger, it is almost impossible to tamper with the transaction data. Additionally, because smart contracts are self-executing, there is no need for a middleman or

intermediary, which reduces the risk of fraud.

Transparency: Blockchain technology provides transparency in banking transactions. All parties involved in the transaction can see the progress of the transaction in real-time, and because the transaction is recorded on the blockchain, it can be audited at any time.

Efficiency: Smart contracts can increase the efficiency of banking transactions. Because the contract executes automatically when the conditions are met, there is no need for manual intervention, which can reduce processing times and costs.

Overall, blockchain technology in banking transactions using smart contracts can provide numerous benefits, including security, transparency, and efficiency. However, it is important to ensure that the smart contracts are properly designed, tested, and audited to ensure their reliability and security.

B. Consensus

Consensus mechanisms and smart contracts are both important components of blockchain technology in the banking industry.

Consensus mechanisms are used to ensure that all nodes in a decentralized blockchain network agree on the current state of the ledger. There are several different consensus mechanisms, such as Proof of Work (PoW), Proof of Stake (PoS), and Delegated Proof of Stake (DPoS), among others. These mechanisms enable nodes in the network to validate transactions and add new blocks to the blockchain in a secure and transparent manner.

Smart contracts, on the other hand, are self-executing digital contracts that are stored on a blockchain. They contain rules and regulations that govern the exchange of assets or information between parties. When certain conditions are met, the smart contract executes automatically, without the need for intermediaries.

In the banking industry, consensus mechanisms are used to ensure the integrity of the ledger and prevent fraud, while smart contracts can automate and streamline many banking processes, such as loan approvals, trade settlements, and asset transfers. For example, a bank could use a smart contract to automatically approve a loan if certain conditions are met, such as the borrower having a certain credit score and income level. This can reduce the time and cost of loan approvals and increase efficiency in the banking industry.

Overall, the combination of consensus mechanisms and smart contracts can make blockchain technology a powerful tool for the banking industry, enabling secure, transparent, and efficient transactions and processes

Proposed Work

In this section, the proposed work is elaborated at a high-level scope. Blockchain technology has the potential to transform not only financial services, but many other industries as well. While traditional financial systems are heavily reliant on paper and vulnerable to issues such as fraud and delays, blockchain technology offers increased security and efficiency. Blockchain's dynamic nature allows it to become a leader in implementation in a chargeable market situation. The advantage of blockchain technology is that it provides a shared database that is accessible to all parties involved.

A. Things blockchain can do for the financial sector

In the financial sector, blockchain can offer several benefits, including:

a) On-chain settlement*:*

The proposed system can provide a platform for banks to reduce fraud and

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offer on-chain settlement to users, reducing processing time and eliminating the need for centralized confirmation of transactions.

b) Low transfer fees*:*
The proposed platform will have a transparent cost model for sending money cross-border, eliminating intermediaries, and reducing transaction costs for users.

c) *24/7* Availability*:*
The platform will be always accessible from anywhere in the world, with nodes in the distributed network verifying transactions and completing processes quickly.

d) Transparency*:*
The proposed platform will have a transparent conversion rate visible to users, allowing them to view transaction history and conversion rates with ease.

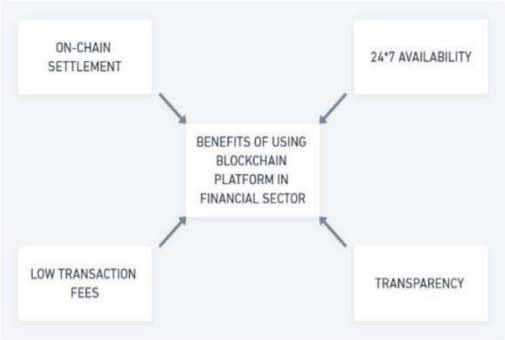

Fig 1:Benefits of using Blockchain

B. Proposed Working of Platform:
The platform proposes that every bank registered on the blockchain network must update the encrypted customer data in the ledger to ensure data security. All banks on the platform will share the same ledger, ensuring transparency and transaction history. This model based on distributed ledger technology will ensure 24/7 availability and reduce transaction processing time. Verification of transactions by every node present in the network will eliminate the problem of double spending present in centralized systems. The platform will provide on-chain settlement with minimal transaction costs.

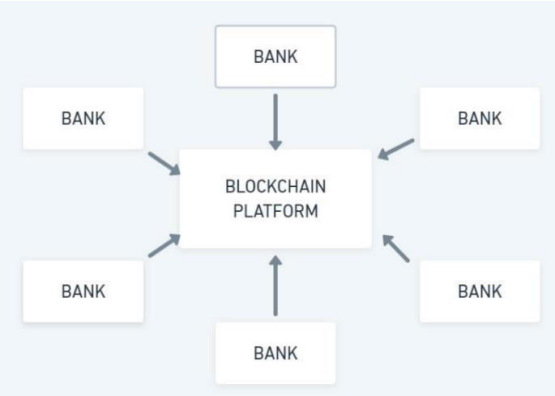

Fig 2: Banks on Blockchain Platform

When a user initiates a money transfer, the proposed platform will offer various benefits over the traditional centralized system. The registered banks on the blockchain platform will interact with each other through the shared ledger. Users can only send money to other users registered on the platform, with all their information stored in the distributed ledger.

The user initiating the transfer will have complete transparency for the transaction and will only pay negligible fees. The funds will be available to the recipient once more than 75% of the nodes in the network verify the transaction. Additionally, the platform's availability will allow users to send money overseas without visiting a physical bank. The transaction will be subjected to a consensus mechanism carried out by the network's nodes.

Compared to the centralized system, the proposed platform will have the advantage of immutability, which reduces the possibility of fraudulent conversions.

C. Benefits of the proposed platform*:*
The proposed platform offers a single database for user information, reducing the need for multiple KYC processes by different banks. The process of

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transferring money will be automated, resulting in faster transaction times, which will be beneficial to users sending money to any part of the world.

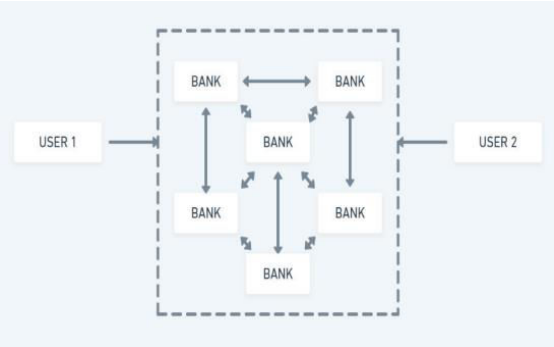

Fig 3: Transaction made through proposed platform

Results and Observations

In the proposed system we have developed an online website platform where users can register and login to use the services of banking using blockchain. The following are the results and observations of the proposed system.

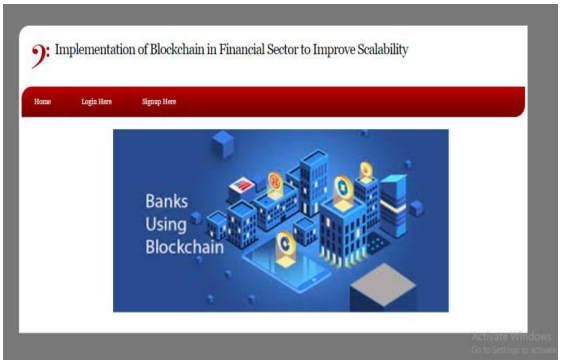

Fig 10: Home page

The above figure is the landing page of the website which includes the options for sign up and login.

Click Sign Up button to see the below page where user can register with platform by providing necessary details.

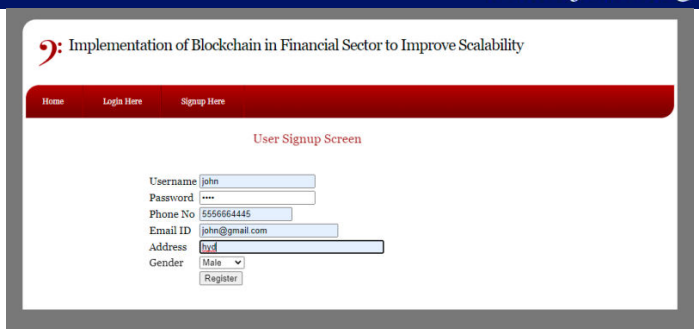

Fig 11: Sign Up page

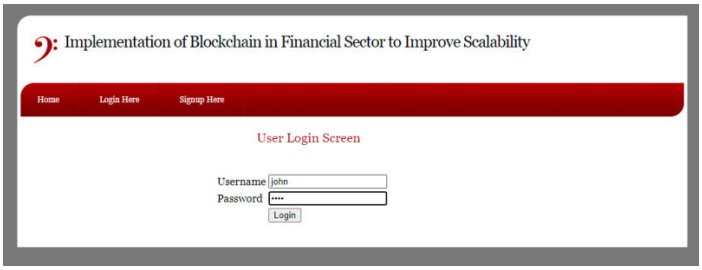

Fig 12: Login Page

Fig 13: Welcome page after Login

Fig 14: Self Deposit Page

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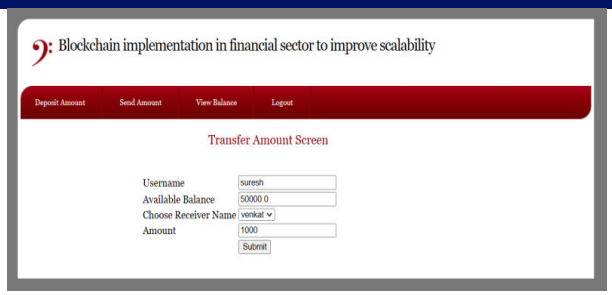

Fig 15: Send Amount Page

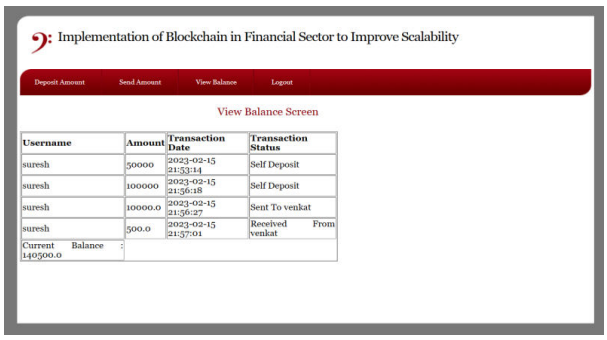

Fig 16: View Balance Page with history of transactions

Conclusions & Future Scope

In conclusion, blockchain technology has the ability to transform the banking industry by offering a transparent and secure platform for financial transactions. The application of blockchain in banking can improve security, decrease transaction costs, boost efficiency, and increase transparency. Banks can use blockchain to eliminate intermediaries, decrease mistakes, and provide customers with faster and less expensive services. Blockchain also empowers banks to combat fraudulent activities and money laundering, while ensuring compliance with regulations.

However, some challenges must be resolved before blockchain can be widely adopted in the banking industry. These obstacles include regulatory issues, scalability problems, and interoperability with existing systems. Furthermore, the implementation of blockchain necessitates significant investment in technology and infrastructure.

Despite these challenges, the benefits of blockchain in the banking industry are substantial. Through continued research and development, blockchain technology can revolutionize how banks operate, providing more reliable and efficient financial services to customers. Therefore, it is necessary for banks to explore and invest in blockchain technology to stay competitive and satisfy the evolving needs of customers in the digital era.

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