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BLOCK CHAIN TECHNOLOGY FOR DECENTRALIZED BANKING AND FINANCIAL INCLUSION

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Abstract

Blockchain based crypto based currencies have made it possible to implement a fund transfer system in a more efficient, hassle-free and secure way. The present banking system contains human intervention at many stages wherein system users can modify bank details, bank balance in a fraudulent way. In the classical banking system, users have to wait for a longer time to deposit and withdraw money. Now-a-days all business or common peoples are heavily dependent on banking system to manage their financial services Blockchain-based cryptocurrencies have revolutionized the landscape of financial transactions by enabling faster, more secure, and transparent fund transfers.** Unlike traditional banking systems—which often involve multiple intermediaries and manual verification steps— blockchain offers a decentralized framework that minimizes human intervention and, by design, reduces the potential for fraud or tampering. In classical banking environments, system administrators or insiders may have the ability to manipulate sensitive data such as account balances or transaction histories, which exposes the system to vulnerabilities and unethical practices. Moreover, conventional fund transfers whether depositing, withdrawing, or sending money—typically involve significant delays, especially across different banks or international borders, due to clearance protocols, banking hours, and regulatory bottlenecks. Blockchain eliminates many of these constraints. By using cryptographic techniques and distributed ledger technology, it ensures that each transaction is verified by a consensus mechanism and recorded in an immutable, transparent ledger accessible to all participants. This not only enhances security but also boosts trust among users, as transactions are verifiable and irreversible. Today, as digitalization permeates every aspect of society, both individuals and businesses increasingly rely on banking services to handle their finances. In this context, blockchain-based cryptocurrencies offer a compelling alternative that aligns with the growing demand for real-time, autonomous, and tamper-resistant financial ecosystems.

Index Terms: Blockchain, Ethereum, Contract address, Tampering, International borders.

Introduction:

As of late, it has been seen that there are numerous information breaks occurring in the financial framework. Programmers are taking huge measures of cash from banks as a result of the security issue of the financial framework. Additionally, the financial framework is improving gradually. Indeed,

even in the 21th 100 years, it requires a great deal of investment, at times days, to make transactions. The motivation behind this paper is to break down the Blockchain framework and find its utilization cases in the financial framework. It will exhibit why the execution of the Blockchain can make the financial business safer and make exchanges quicker. The meaning of the paper is to help the chiefs of the financial area and government to cause them to comprehend blockchain innovation and it's possibility in the financial area. Any industry being the mediator between the exchanges is helpless to dangers like fakes, crashes, and digital assaults. Since most the financial frameworks are upheld a unify information base, they're more vulnerable to infiltration assaults, which can think twice about classified subtleties of customers of the bank. Also with respect to the administrations given by the bank, the client needs to pay the conditional above. On the contrary hand, the bank should record and keep up with all the conditional subtleties for each client, which is generally huge concerning information. Blockchain innovation is that the answer for those issues of the present customary industry. Blockchain innovation began when a report named "Bitcoin: A Distributed Electronic Money Framework" was delivered in 2008 by Satoshi Nakamoto.. the planet Monetary Gathering (WEF), in 2016 has thought that blockchain innovation will be prepared to change monetary administrations inside the financial area by making a stage that interfaces buyers and makers straightforwardly. A Blockchain is a computerized, unfaltering, scattered record that successively keeps exchanges progressively. Blockchain innovation can possibly totally change the general monetary industry by offering the various chances of how individuals execute with cash and values. Blockchain innovation is another innovation which depends on mathematical and monetary presumptions for dealing with an information base between various individuals without the interest of any focal power. It is a guaranteed dispersed data set, alter clear, wherein the viability of an exchange can be checked by parties in the exchange. Each gathering of these exchanges is doled out to as a "block". A Block records some or the entirety of the ongoing exchanges and goes into a blockchain as an extremely durable record whenever it is finished advantage of Blockchain is that monetary exchanges never again need any focal power and are immediately approved, cleared and settled. Blockchain innovation arise to be a development which guarantees a significant change for capital business sectors and other monetary administrations. Blockchain might be a decentralized record acclimated safely trade computerized cash, perform arrangements and exchanges. Every individual from the organization approaches the chief late duplicate of scrambled record so as that they will approve a new exchange. Blockchain record likely could be a gathering of all Bitcoin exchanges executed inside the past. Fundamentally, it's a circulated data set which keeps a constantly developing sealed association blocks which holds clusters of individual exchanges. The completed blocks are included an incredibly exceptionally straight and sequential request. Each block contains a timestamp and information connect which focuses to a past block. Banking and monetary establishments are utilizing Blockchain based innovation to scale back risk and thwart digital extortion.

LITERATURE SURVEY

Title: Block Chain Technology For Decentralized Banking and Financial Inclusion

1.Author: Z. Zheng, S. Xie, H. Dai, X. Chen, and H. Wang

Year: 2017 IEEE International Congress on Big Data (BigData Congress), 2017, pp. 557564, doi:

10.1109/BigDataCongress.2017.85.

Abstract: This paper provides a comprehensive overview of blockchain technology, focusing on its fundamental architecture, consensus mechanisms, and potential future trends. The study explores how blockchain, originally designed for Bitcoin, has evolved to support various applications beyond cryptocurrency, including financial services, healthcare, and supply chain management. The paper also examines different consensus algorithms such as Proof of Work (PoW), Proof of Stake (PoS), and Byzantine Fault Tolerance (BFT). Additionally, the authors discuss scalability challenges, security concerns, and the ongoing research aimed at improving blockchain efficiency. Future trends in blockchain technology, including cross-chain communication, smart contract advancements, and regulatory considerations, are also highlighted.

Merits:

• Comprehensive Overview: Thorough explanation of blockchain architecture, consensus
mechanisms, and its evolution beyond Bitcoin.
• In-depth Consensus Discussion: Explores key consensus algorithms like PoW, PoS, and
BFT.
• Multidisciplinary Applications: Highlights blockchain's potential in various sectors like
finance, healthcare, and supply chain management.
• Future Trends: Discusses cross-chain communication, smart contracts, and regulatory
issues for future research.
• Security & Scalability Concerns: Addresses critical challenges related to blockchain
scalability and security.

Demerits:

• Lack of Technical Details: Lacks deep technical implementation and practical development
insights.
• Potential Outdated Information: Published in 2017, may be outdated as blockchain
technology has evolved.
• Generalized Challenges: Discusses scalability and security without deep real-world case
studies or actionable solutions.
• Limited Regulatory Focus: Brief mention of regulatory issues, but lacks in-depth
exploration.

Title: Block Chain Technology For Decentralized Banking and Financial Inclusion 2.Author: D. Mingxiao, M. Xiaofeng, Z. Zhe, W. Xiangwei, and C. Qijun Year:2017 Abstract: This paper reviews the various consensus algorithms used in blockchain technology, analyzing their efficiency, security, and applicability in different scenarios. The study categorizes consensus mechanisms into traditional models like Proof of Work (PoW) and Proof of Stake (PoS), and emerging approaches such as Delegated Proof of Stake (DPoS), Practical Byzantine Fault Tolerance (PBFT), and Hybrid consensus models. The authors compare these algorithms based on parameters like computational cost, decentralization, attack resistance, and transaction speed. The paper also discusses the tradeoffs between security and scalability in blockchain networks, emphasizing the need for improved consensus models to support large-scale

applications. Merits: • Comprehensive Review: Thorough overview of consensus algorithms in blockchain. • Categorization: Clear structure categorizing traditional and emerging models. • Detailed Comparison: Compares algorithms on key parameters like cost, decentralization, and speed. • Insight into Trade-offs: Discusses security vs scalability challenges in blockchain networks. • Real-World Application Focus: Highlights the applicability of algorithms in practical scenarios. Demerits: • Lack of Depth: Limited technical detail on how each algorithm works. • Focus on Well-Known Algorithms: Limited exploration of newer or niche consensus models. • Limited Practical Challenges Discussion: Lacks coverage of real-world implementation difficulties. • Outdated Insights: Doesn't account for newer advancements post-2017. • No Experimental Validation: Lacks empirical data or experimental results for the claims made. Title: Block Chain Technology For Decentralized Banking and Financial Inclusion 3.Author: Satoshi Nakamoto Year:2008 Abstract: This seminal paper by Satoshi Nakamoto introduces Bitcoin, the first decentralized peer-to-peer electronic cash system. The paper outlines a system that eliminates the need for intermediaries by utilizing a distributed ledger technology called blockchain. Nakamoto proposes the Proof of Work (PoW) consensus mechanism to prevent doublespending and ensure network security. The paper details the Bitcoin protocol, including transaction validation, mining
incentives, and cryptographic security measures. It also discusses how decentralization and immutability make Bitcoin a viable alternative to traditional financial systems. The paper has laid the foundation for the broader blockchain revolution, influencing the development of numerous cryptocurrencies and decentralized applications. Merits:

• Foundation of Bitcoin: Introduces the concept of Bitcoin, the first decentralized digital currency.

• Innovative Technology: Pioneers blockchain and Proof of Work (PoW) for secure, tamperproof transactions.

• Eliminates Intermediaries: Proposes a system without the need for trusted third parties.

• Comprehensive Protocol Details: Provides an in-depth explanation of the Bitcoin protocol, including transaction validation and mining.

• Influence on Blockchain Revolution: Lays the groundwork for the growth of cryptocurrencies and decentralized applications.

Demerits:

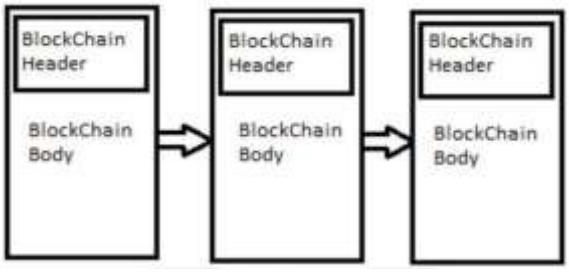
• Lack of Scalability Solutions: Does not address scalability issues that Bitcoin faces in its early stages.

• Limited Discussion on Practical Implementation: Focuses on the theory, with little attention to real-world challenges or adoption hurdles.

• Security Assumptions: Assumes the effectiveness of PoW without discussing potential vulnerabilities or the environmental impact of mining.

• Absence of Economic Considerations: Does not explore broader economic implications of a decentralized financial system.

System Architecture:

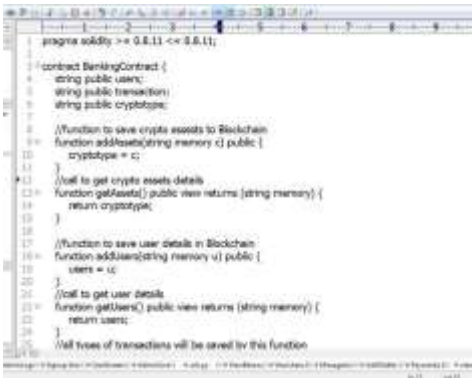


Module Description Blockchain is a decentralized, distributed ledger technology that enables secure, transparent, and

tamper-proof recording of transactions across a network of computers. It gained prominence as the underlying technology behind cryptocurrencies like Bitcoin, but its applications extend far beyond digital currencies. Here's a detailed breakdown of how blockchain works.

Decentralization: Traditional databases are centralized, meaning there's a single point of control. In contrast, blockchain operates on a decentralized network of computers (nodes). Each node has a copy of the entire blockchain database, ensuring no single entity has control over the data. Distributed Ledger: The blockchain is a continuously growing list of records called blocks. Each block contains a timestamp and a link to the previous block, forming a chronological chain of blocks - hence the name "blockchain." This structure ensures the integrity and immutability of the data. Consensus Mechanisms: To validate and add new blocks to the blockchain, nodes in the network must agree on the validity of transactions. Various consensus mechanisms, such as Proof of Work (PoW), Proof of Stake (PoS), and Delegated Proof of Stake (DPoS), are used to achieve this agreement without the need for a central authority. Cryptography: Blockchain relies heavily on cryptographic techniques to secure the data. Each block contains a cryptographic hash of the previous block, creating a chain that is resistant to tampering. Additionally, transactions within blocks are encrypted, ensuring privacy and confidentiality. Smart Contracts: Smart contracts are self-executing contracts with the terms of the agreement directly written into code. They automatically execute and enforce the terms of the contract when predefined conditions are met. Smart contracts are a key feature of blockchain platforms like Ethereum, enabling a wide range of decentralized applications (DApps). Immutable Recordkeeping: Once a transaction is recorded on the blockchain, it cannot be altered or deleted. This immutability makes blockchain a trustworthy and reliable system for recording and verifying transactions, reducing the risk of fraud and manipulation. Transparency and Traceability: All transactions on the blockchain are transparent and publicly accessible. Anyone with access to the blockchain can view the entire transaction history, promoting accountability and trust in the system. This transparency also facilitates traceability, enabling users to track the origin and movement of assets or goods. Permissioned vs. Permissionless Blockchains: Blockchain networks can be either permissioned (private) or permissionless (public). Permissioned blockchains restrict access to authorized participants, making them suitable for enterprise applications requiring privacy and control. Permissionless blockchains, on the other hand, allow anyone to participate in the network, promoting openness and inclusivity. Overall, blockchain technology has the potential to revolutionize various industries by providing secure, transparent, and efficient solutions for recordkeeping, transaction processing, and value exchange

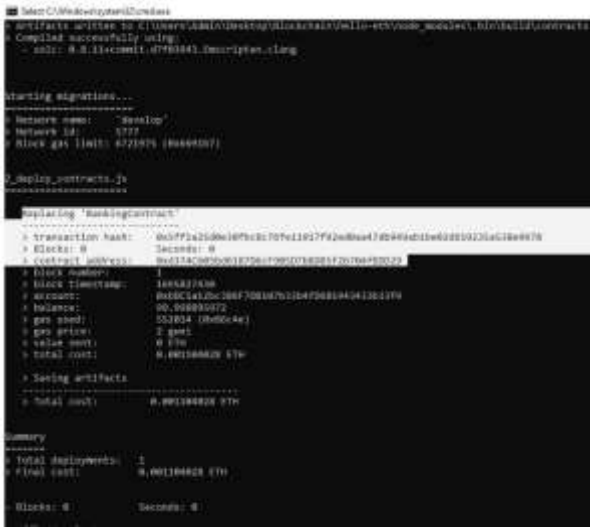
IMPLEMENTATION:



```
pragma solidity >= 0.8.11 <= 0.8.11;

contract BankingContract {
    string public users;
    string public transaction;
    string public cryptotype;

    //function to save crypto assets to Blockchain
    function addAssets(string memory c) public {
        cryptotype = c;
    }
    //call to get crypto assets details
    function getAssets() public view returns (string memory) {
        return cryptotype;
    }

    //function to save user details in Blockchain
    function addUsers(string memory u) public {
        users = u;
    }
    //call to get user details
    function getUsers() public view returns (string memory) {
        return users;
    }
    //all types of transactions will be saved by this function
```

Above smart contract is designed using solidity program and this program contains function to save user and transaction details. Now we need to deploy above contract to Blockchain by following below steps

In above screen Blockchain Ethereum tool started and created some default accounts and private keys and now type command as 'migrate' and press enter key to deploy contract and get below output



In above screen in white colour text we can see contract deployed and we got contract address and this address we need to specify in Python program to access contract in Blockchain to save and get transaction details. In below screen I am showing python code calling above contract

In above screen click on 'Admin Login' link to login as admin and get below page

In above screen admin is login and after login will get below page

In above screen admin can click on 'Asset Management' link to add crypto type like below screen

In above screen author selecting available crypto and its base price and then click on 'Submit' button to get below page

In above screen in red colour text we can see Asset details added to Blockchain and now click on 'View Users' link to get list of registered users and get below page

In above screen can see list of registered users and now logout and signup new user

In above screen user can click on 'Wallet Management' link to add crypto amount to wallet and get below page

Conclusion:

In summary, "hello-eth" represents more than just a simple greeting; it symbolizes the first step in a developer's journey into the fascinating world of Ethereum smart contract development. By mastering the creation and deployment of basic smart contracts like "hello-eth," developers lay a solid foundation for building more complex and impactful decentralized applications on the Ethereum blockchain. Recently, there have been significant changes in banking on account of the Blockchain. As the Blockchain permits untrusted gatherings to concur on the condition of a data set, individuals don't have to depend on agents for an exchange. Blockchain innovation offers monetary types of assistance, for example, installments, without utilizing any outsider like a bank. Blockchain can give quicker instalments and lower expenses than banks, with the decentralization record for installments. On open blockchains, protections like stocks, bonds, and elective resources are set. This makes more productive capital business sectors. Blockchain technology is that the growing invention which has a sequence of blocks. Banking and financial institutions are using Blockchain based technology to cut back risk and forestall cyber fraud. The transaction data is stored in a very distributed database. Any banking industry being the middleman between the transactions is at risk of threats like frauds, crashes, and cyber-attacks. Blockchain technology helps to get rid of the necessity for an intermediary expert. Most the banking systems are supported to the centralized databases, they're more liable to penetration attacks, which can compromise the confidential details of consumers of the bank. Banking as a service requires maintaining and securing customer information to guard it from hackers, which is increasing day-by- day. The blockchain technology is a peer-to-peer distributed structure which could be used to overcome the issue in the traditional banking system

Future enhancement:

Aims at giving these functionalities in a distributed banking system using blockchain, which will be at par with the current methodologies. It will also focus on the limitations while implementing blockchain and future scope. Some of the top benefits of Blockchain in banking are given below: • Cost reduction • Faster transactions • Improved security • Improved information quality

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