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A Novel And Transparent Banking System Using Blockchain Technology

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Abstract: Blockchain-based cryptocurrencies have revolutionized the fund transfer system by offering an efficient, hassle-free, and secure alternative to traditional banking. The current banking system relies on human intervention at multiple stages, making it vulnerable to fraudulent modifications of bank details and balances. Additionally, classical banking processes often involve delays in deposits and withdrawals, causing inconvenience to users who depend on financial services for their daily transactions. This research explores a decentralized banking system leveraging smart contracts to eliminate intermediaries, enhance security, and expedite transactions.The methodology involves implementing Ethereum-based smart contracts, which autonomously execute and enforce financial agreements without third-party involvement. By leveraging cryptographic hashing and consensus mechanisms such as Proof of Work or Proof of Stake, the system ensures transparency, immutability, and security. Smart contracts manage wallet transactions, fund transfers, and payment processing, automating banking operations while reducing fraud risks.By integrating blockchain into banking, trustless transactions become feasible, reducing operational costs and enhancing financial inclusion. The proposed system ensures real-time processing with secure, tamper-proof records.Blockchain-based decentralized banking presents a viable solution to the inefficiencies of traditional banking, offering a more secure and transparent financial ecosystem that benefits **businesses** and individuals alike while reducing dependency on centralized financial institutions**.**

Keywords:Blockchain, Decentralized Banking, Cryptocurrency, Fund Transfer, Smart Contracts, Financial Security, Transparency,Fraud Prevention, Real-time Transactions, Financial Inclusion, Digital Banking, Immutable Ledger, Secure Transactions.

I. INTRODUCTION

The rapid evolution of financial technologies has brought significant changes to the global banking system. Traditional banking methods have long been the backbone of economic transactions, providing financial services such as fund transfers, loans, and savings. However, these systems are often plagued by inefficiencies, high transaction costs, security vulnerabilities, and dependency on centralized institutions. Many of these banks rely on human intervention at multiple stages, making them susceptible to fraud, errors, and unauthorized modifications of bank details or balances. Additionally, cross-border transactions and fund transfers often require multiple intermediaries, leading to delays, increased processing fees, and security concerns. As the financial sector continues to digitize, there is a pressing need for a more secure, transparent, and efficient banking system that minimizes human intervention and maximizes reliability.

Blockchain technology, initially introduced as the backbone of cryptocurrencies, has emerged as a revolutionary solution for decentralizing financial transactions. Unlike conventional banking systems, blockchain operates on a distributed ledger that ensures data integrity, security, and transparency. By leveraging cryptographic hashing, smart contracts, and consensus mechanisms such as Proof of Work and Proof of Stake, blockchain enables a trustless environment where transactions are recorded immutably without the need for intermediaries. The elimination of third parties not only enhances transaction speed but also significantly reduces operational costs. The decentralized nature of blockchain ensures that no single entity has control over the financial system, mitigating risks associated with data breaches, fraudulent modifications, and cyberattacks.

A decentralized banking system built on blockchain technology offers numerous advantages over conventional banking. It provides faster transaction processing, reduces dependency on intermediaries, and ensures that records remain tamper-proof. Moreover, blockchain-based banking enables seamless cross-border payments, allowing individuals and businesses to conduct transactions without delays or excessive fees. Financial inclusion is another critical aspect, as blockchain banking can provide services to unbanked or underbanked populations, who often lack access to traditional financial institutions. Smart contracts further automate financial transactions, ensuring that agreements are executed without manual oversight, reducing the risk of errors and disputes. These features make blockchain banking an ideal candidate for the future of financial transactions.

As the global economy continues to shift toward digitalization, the adoption of blockchain in banking is gaining momentum. Many financial institutions and governments are exploring the potential of decentralized finance to transform the way financial transactions are conducted. However, challenges such as regulatory concerns, scalability issues, and technological barriers must be addressed before widespread implementation can occur. Despite these hurdles, blockchain-based banking systems present a promising alternative that enhances security, efficiency, and transparency. This research explores the impact of blockchain on the banking sector, analyzing its benefits, challenges, and potential future developments in creating a decentralized, fraud-resistant, and user-friendly financial ecosystem.

1.2 Motivation:

The constraints of existing banking systems, which are frequently expensive, slow, and vulnerable to fraud because of human participation, are what spurred this study. Inefficiencies and security breaches have grown to be serious issues as digital transactions increase. By doing away with middlemen and cutting down on transaction delays, blockchain technology provides a decentralized, transparent, and safe alternative. Blockchain banking makes use of cryptographic security and smart contracts to guarantee unchangeable financial transactions. By giving unbanked communities access to banking services, it also improves financial inclusion. The purpose of this study is to investigate how blockchain technology can transform banking by solving issues of accessibility, efficiency, and fraud prevention in the financial industry.

1.3 Objectives:

- To implement blockchain technology to create a decentralized banking system that ensures security, immutability, and transparency in financial transactions.
- To explore how blockchain-based banking can minimize human intervention, eliminate third-party intermediaries, and lower transaction fees while maintaining efficiency.
- To investigate the use of smart contracts and consensus mechanisms to enable real-time, hassle-free fund transfers without delays.
- To analyze how blockchain banking can provide secure and affordable financial services to unbanked and underbanked populations globally.

1.4 Literature Survey:

Blockchain technology has emerged as a transformative force in the banking sector, offering enhanced security, transparency, and efficiency. Wadhwa and Sahoo conducted a systematic literature review highlighting the various applications of blockchain in banking, including secure transactions, fraud prevention, and decentralized financial services[2]. Their study emphasizes how blockchain eliminates intermediaries, reducing transaction costs and processing times while ensuring tamper-proof records. The review also explores the integration of smart contracts in banking, which automate processes such as loan approvals and fund transfers, thereby increasing operational efficiency. Furthermore, it discusses how blockchain-based banking improves financial inclusion by providing access to secure and decentralized financial services for unbanked populations, particularly in developing economies.

Similarly, Stoica and Sitea examined the impact of blockchain on the financial technology sector and the broader banking system. Their study explores how blockchain disrupts traditional financial models by enabling decentralized finance , reducing reliance on central authorities, and enhancing the security of digital transactions[3]. They analyze various blockchain frameworks, including permissioned and permissionless ledgers, and their implications for banking institutions. The research also highlights regulatory challenges associated with blockchain adoption in banking, emphasizing the need for new legal frameworks to accommodate decentralized financial systems. Both studies underscore the revolutionary potential of blockchain in banking while acknowledging challenges such as scalability, compliance, and adoption barriers that must be addressed for widespread implementation.

Zhang et al. conducted a comparative study analyzing blockchain networks in decentralized banking systems. Their research explores the structural differences between traditional banks and decentralized financial institutions , focusing on aspects such as transaction speed, security, and operational efficiency. The study provides a detailed assessment of various blockchain consensus mechanisms, including Proof of Work and Proof of Stake and their impact on banking transactions[4]. Additionally, it highlights how decentralized banks leverage smart contracts to automate lending, asset management, and fund transfers while ensuring transparency and security. The findings suggest that blockchain-based banking systems can outperform traditional financial models by eliminating intermediaries, reducing fraud risks, and improving financial accessibility for global users.

Syarkani, Subu, and Waluyo examined the role of blockchain in revolutionizing financial risk management within the global banking sector. Their research emphasizes how blockchain enhances risk mitigation by providing immutable transaction records, thereby preventing fraud and unauthorized modifications in banking operations. The study explores how decentralized ledger technology can improve compliance with financial regulations by offering transparent and auditable transaction histories[5]. Moreover, it discusses the integration of artificial intelligence and blockchain in predictive risk assessment models, which enable banks to identify potential financial threats and fraud patterns proactively. The research concludes that blockchain's role in financial risk management is crucial for increasing trust, reducing operational costs, and ensuring more secure banking transactions in an increasingly digitized economy.

Kumar and Tripathi explored the application of blockchain technology in securing online banking transactions. Their study highlights the vulnerabilities of traditional online banking systems, which are often targeted by cyber threats such as hacking, phishing, and fraudulent modifications of financial data[6]. The authors emphasize how blockchain's decentralized and cryptographic nature enhances transaction security by eliminating single points of failure and ensuring data integrity. The research also discusses the role of smart contracts in automating secure financial transactions, reducing the risk of human errors and fraudulent activities. Additionally, the study compares different consensus mechanisms, such as Proof of Work and Proof of Stake , and their effectiveness in securing banking transactions. The findings suggest that blockchain-based banking systems can significantly enhance security, reduce fraud, and improve user trust in digital banking services.

1.5 Blockchain Ethereum Architecture

Ethereum is a decentralized, open-source blockchain platform that extends beyond financial transactions, enabling developers to build and deploy smart contracts and decentralized applications (DApps). Unlike Bitcoin, which primarily functions as a digital currency, Ethereum provides a robust infrastructure for executing programmable contracts autonomously. At the core of Ethereum's functionality lies the Ethereum Virtual Machine (EVM), a decentralized runtime environment that executes smart contracts on a global network of nodes. These smart contracts, written in Solidity, are self-executing programs that automatically enforce agreements without intermediaries. Ethereum operates on a Proof of Stake (PoS) consensus mechanism through its Ethereum 2.0 upgrade, enhancing security, scalability, and energy efficiency compared to the previous Proof of Work (PoW) model.

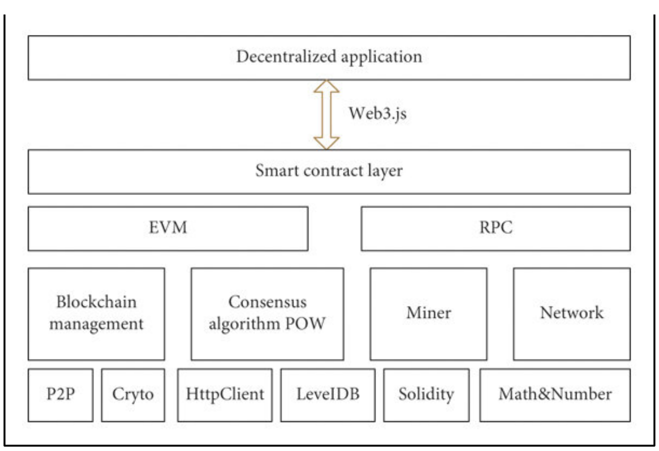

Fig1:Ethereum Architecture Overview

One of Ethereum's most powerful tools is the Truffle Suite, which provides a development framework for compiling, testing, and deploying smart contracts. It consists of Truffle (a development environment), Ganache (a local blockchain for testing), and Drizzle (a front-end library for Ethereum DApps). Developers use Remix IDE, a browser-based environment, for writing, debugging, and deploying smart contracts directly onto the Ethereum network. Additionally, Web3.js and Ethers.js are widely used JavaScript libraries that enable interaction with the Ethereum blockchain, allowing developers to send transactions, deploy contracts, and query blockchain data from web applications. These tools collectively streamline the development of decentralized finance (DeFi) platforms, non-fungible tokens (NFTs), and other blockchain-based applications.

Ethereum's ecosystem is further enhanced by Layer 2 scaling solutions such as Polygon (Matic), Optimistic Rollups, and zk-Rollups, which help mitigate the network's congestion and high gas fees by processing transactions off-chain before finalizing them on the main Ethereum blockchain. The introduction of ERC-20, ERC-721, and ERC-1155 token standards has revolutionized the creation of digital assets, enabling seamless integration of cryptocurrencies, NFTs, and multi-token systems. Ethereum's decentralized finance (DeFi) ecosystem, powered by smart contracts, facilitates lending, staking, and yield farming without intermediaries. Platforms like Uniswap, Aave, and Compound leverage Ethereum's blockchain to enable peer-to-peer financial transactions in a trustless manner.

The security of Ethereum-based applications is ensured through cryptographic hashing (Keccak-256), decentralized consensus mechanisms, and audit tools such as MythX and Slither, which analyze smart contract vulnerabilities. The implementation of Ethereum Improvement Proposals (EIPs) allows continuous upgrades, improving security and efficiency. Ethereum's transition to Ethereum 2.0 (ETH 2.0), with its Beacon Chain, Shard Chains, and Casper consensus mechanism, aims to enhance scalability and reduce environmental impact. As blockchain technology evolves, Ethereum remains a critical tool for decentralized applications, offering a versatile and secure framework for the next generation of financial and technological innovations.

1.6Ethereum smart contracts

Ethereum smart contracts follow a structured lifecycle, from development to execution on the blockchain. This lifecycle consists of several stages: writing, compiling, deploying, interacting, and termination. Smart contracts are written in Solidity, compiled into bytecode, and executed by the Ethereum Virtual Machine (EVM). Each stage involves cryptographic security, transaction fees (gas costs), and state transitions governed by Ethereum's consensus mechanism.

$$\sigma' = \gamma(\sigma, T) \text{.................Eq(1)}$$

where σ is the current Ethereum state, T is the transaction input, γ is the state transition function, and σ′ is the new state after execution. When a transaction is sent to a smart contract, it triggers predefined logic encoded in Solidity, modifying account balances, contract storage, and global Ethereum state. The Ethereum Virtual Machine (EVM) processes transactions by executing bytecode instructions, ensuring deterministic execution across all nodes in the network.

A successful transaction updates contract variables, emits events, or interacts with other contracts. If execution fails due to insufficient gas or invalid operations, Ethereum enforces a revert state, ensuring no partial execution occurs. Additionally, storage operations incur higher gas costs since modifying persistent storage impacts Ethereum's state. The selfdestruct() function can remove a contract from the blockchain, refunding remaining Ether while freeing storage. This execution model ensures security, immutability, and decentralized consensus, making Ethereum smart contracts a foundation for DeFi, NFTs, and automated financial applications.

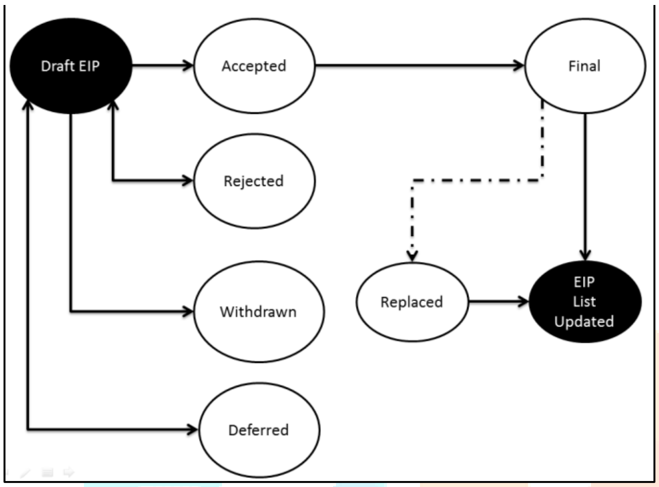

Fig2:Smart Contract Lifecycle

II. PROPOSAL METHOD

The proposed decentralized banking system leverages blockchain technology to enhance transparency, security, and efficiency in financial transactions. The system consists of two primary modules: Admin Module and User Module, each with specific functionalities that enable seamless banking operations. The Admin Module allows administrators to manage cryptocurrencies used in the banking ecosystem. Admins can log in using predefined credentials and oversee the list of registered users. Additionally, they can add and manage various crypto assets, including Ethereum, Bitcoin, and USD Coin, ensuring that digital assets are properly integrated into the system. The blockchain ledger guarantees that all modifications related to cryptocurrency assets are permanently recorded, preventing unauthorized changes or fraudulent activities.

The User Module allows individuals to interact with the decentralized banking system. The first step is User Signup, where new users register with the application by providing credentials and verifying their identity. Once registered, users can log in via the User Login module, which authenticates their credentials using secure blockchain-based verification mechanisms. Upon successful

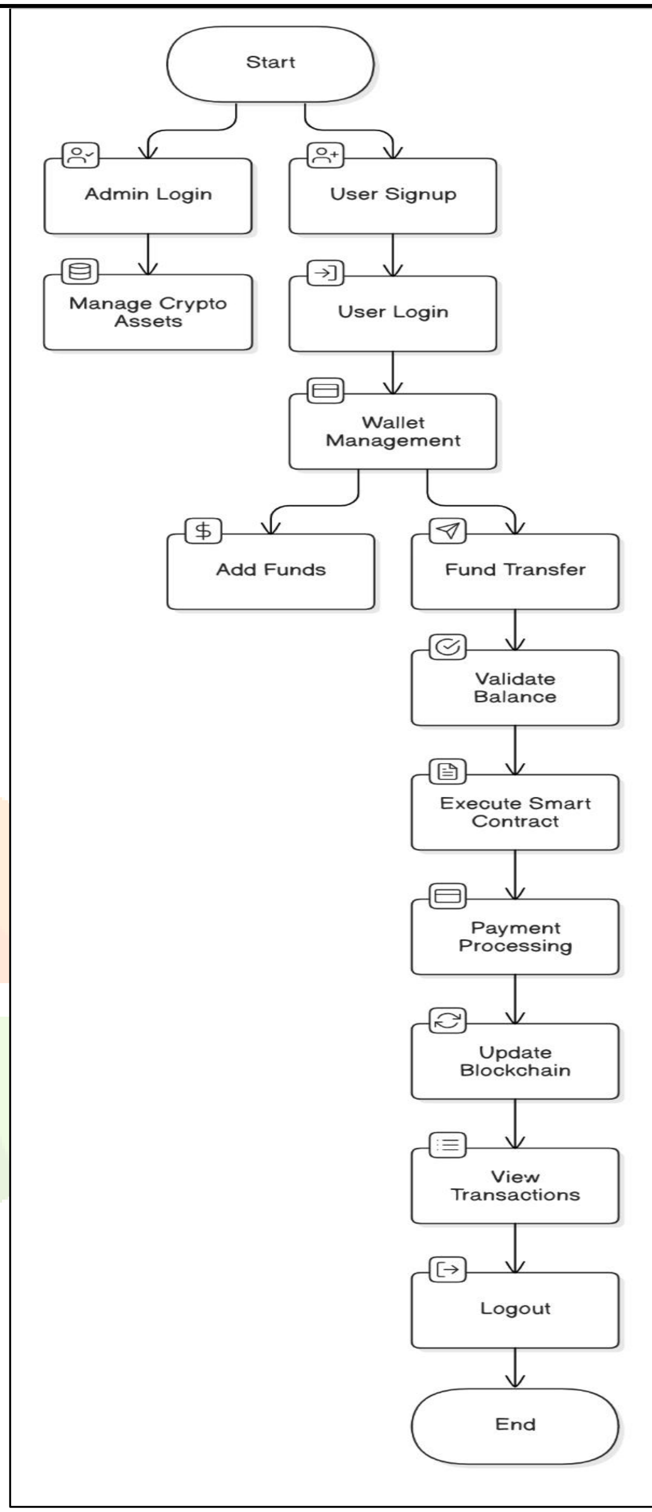

Fig3:Proposal model

After encryption, the secured file is stored in the cloud, login, users gain access to their digital wallet, which acts as their primary financial repository. The system enables users to add dummy funds to simulate transactions, ensuring that each deposit or withdrawal is recorded immutably on the blockchain. This ensures tamper-proof financial transactions, making it impossible to modify transaction histories fraudulently.

One of the core functionalities is Wallet Management, which allows users to manage funds stored in their blockchain wallet. The system maintains an updated ledger of all wallet transactions, providing users with real-time access to their balance. The Fund Transfer module enables users to securely transfer funds between accounts using smart contracts, ensuring instant settlement without intermediaries. Transactions executed through smart contracts follow predefined conditions, such as verifying the sender's balance and recipient's identity before processing the transfer. Gas fees are applied to each transaction, calculated as Gas Used × Gas Price, ensuring fair transaction execution. The decentralized nature of fund transfers eliminates delays, reduces transaction costs, and prevents unauthorized modifications.

The Payments Management module allows users to utilize their digital assets for real-world transactions, including utility bill payments and merchant transactions. Each payment is validated using a blockchain consensus mechanism, ensuring that the funds are securely deducted from the sender's wallet and credited to the merchant's account. The smart contract logic ensures that payments are only processed if the user has sufficient balance, preventing overdraft issues. Additionally, transaction records are stored on the blockchain, providing auditable and immutable payment histories. This feature promotes transparency and eliminates fraudulent activities associated with traditional online payment gateways.

Finally, the View Balance module provides users with real-time access to their account history and current available balance. The system maintains a complete transaction ledger, allowing users to track their spending, deposits, and fund transfers with detailed timestamps. This transparency ensures that users can verify every financial operation, increasing trust in the system. The blockchain-based architecture of this banking system ensures high security, reduced operational costs, and seamless financial management, making it an ideal alternative to traditional banking infrastructures. By integrating smart contracts and decentralized ledger technology, the proposed system redefines digital banking, offering users an efficient and secure financial ecosystem.

III.IMPLEMENTATION

3.1. Admin Module

The Admin Module is responsible for managing the system's digital assets and overseeing registered users. The administrator logs in using predefined credentials and gains access to a dashboard that displays user details and cryptocurrency assets. The system utilizes role-based authentication to ensure that only authorized administrators can modify system settings. Admins can add, update, or remove cryptocurrencies such as Ethereum, Bitcoin and USD Coin Each asset addition triggers a smart contract, ensuring that changes are recorded immutably on the blockchain. The database structure consists of user tables, transaction tables, and asset management tables, with blockchain integration ensuring transparency.

3.2. User Authentication and Wallet Management

The User Module handles registration, login, and wallet management. Users sign up by providing their credentials, which are securely stored using SHA-256 hashing for password encryption. Upon login, the system verifies credentials using a blockchain-based authentication mechanism. Once authenticated, users gain access to their digital wallet, which is implemented using Ethereum smart contracts. The wallet allows users to deposit funds, which are recorded as on-chain transactions. Each transaction incurs gas fees, calculated dynamically based on network congestion. The Metamask API is integrated for Ethereum-based transactions, ensuring secure fund storage. Wallet balances are updated using event listeners in Solidity, ensuring real-time synchronization between blockchain data and the user interface.

3.3. Fund Transfer and Smart Contract Execution

The Fund Transfer module enables users to send digital assets to other accounts securely. Transactions are executed through Solidity-based smart contracts, which validate sender balances and recipient addresses before processing the transfer. The system uses Ethers.js to interact with the smart contract and confirm transaction success. If a transaction fails due to insufficient funds, the contract reverts the transaction to maintain data integrity. Each transaction is time-stamped and stored in a distributed ledger, ensuring an auditable history.

The saveDataBlockChain function allows users to store data on the blockchain by interacting with a deployed smart contract. It constructs a transaction message (msg), calls the contract's store function, and submits the transaction to the Ethereum network. The script ensures blockchain immutability and traceability by recording transactions securely. The connection is established via the Web3.py library, ensuring smooth communication with Ethereum smart contracts. This implementation is crucial for decentralized banking systems, as it facilitates secure asset storage, fund transfers, and financial operations, minimizing risks of fraud and unauthorized modifications while enhancing transparency

3.4. Payment Processing and Transaction History

The Payment Management module allows users to make bill payments using their wallet balance. The system supports predefined services such as utility bills, subscriptions, and merchant transactions. Payments are processed via smart contracts, deducting the amount from the user's balance and crediting the merchant's account. The Ethereum blockchain ensures immutable transaction records, preventing fraud. Users can view their transaction history in the View Balance module, which fetches data from blockchain logs using event-driven architecture. The front-end fetches data using GraphQL APIs to ensure efficient querying of blockchain records. Security is enforced using multi-signature wallets, requiring multiple approvals for high-value transactions. This implementation guarantees a secure, transparent, and decentralized banking system with complete traceability.

IV. RESULTS

The implementation of a decentralized banking system using blockchain technology ensures secure, transparent, and immutable financial transactions. The system allows administrators to manage cryptocurrency assets, while users can perform fund transfers, wallet management, and bill payments through smart contracts.

Transactions are securely recorded on the blockchain, preventing unauthorized modifications and ensuring data integrity. Users can track their balances and transaction history in real time, enhancing trust and efficiency. The integration of Ethereum smart contracts and Web3 technology eliminates intermediaries, reducing processing time and transaction costs. Overall, the system enhances security, reliability, and financial autonomy in digital banking.

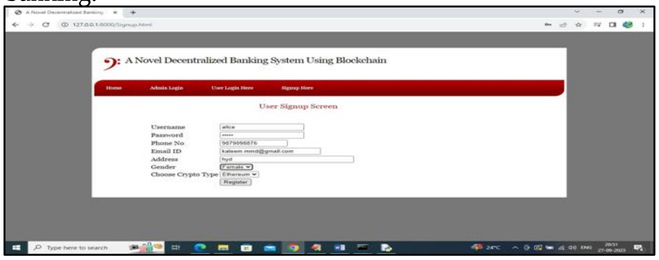

Fig4:Sign Up Page

In the above screen, the admin successfully logs into the system using valid credentials. After authentication, the admin is redirected to the dashboard, which provides an overview of the decentralized banking system. The dashboard contains multiple options, including Asset Management, User Management, Fund Transfers, and Transaction History. From this interface, the admin can monitor registered users, manage digital assets, and oversee all blockchain-based transactions. The integration of blockchain technology ensures that all modifications and transactions performed by the admin are securely recorded on the distributed ledger, preventing unauthorized alterations and enhancing system transparency.

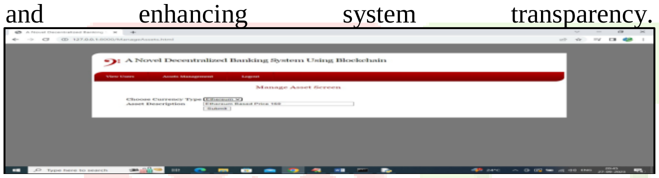

Fig5: Asset Management

In the above screen, the admin clicks on the 'Asset Management' link to manage various cryptocurrency assets. The system allows the admin to select a cryptocurrency type, assign its base price, and register it within the blockchain network. Once the required details are entered, the admin submits the form, triggering a smart contract execution that records the newly added asset on the Ethereum blockchain. The transaction is verified and stored immutably, ensuring that no unauthorized modifications can be made to the asset list. The decentralized ledger maintains a transparent record of all asset additions and price changes.

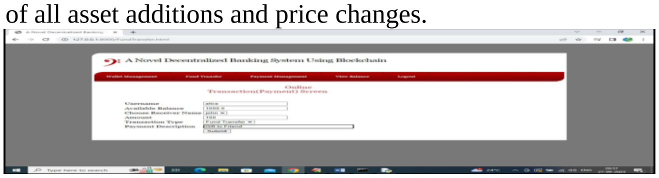

Fig6:Transfer page

In the above screen, the sender initiates a fund transfer by selecting a recipient and entering the transfer amount. Upon pressing the 'Transfer' button, the smart contract validates the sender's balance before executing the transaction. The red-colored text in the interface confirms that the fund transfer has been successfully processed and recorded on the blockchain. Users can click on the 'View Balance' link to check their updated account balance, ensuring real-time transaction tracking. The decentralized banking system prevents fraudulent activities by maintaining an immutable and publicly verifiable ledger for all financial transactions.

Fig7:Payment Management

In the above screen, after transferring 100 coins, the sender's balance decreases to 900, while the recipient, John, logs in and sees 100 coins deposited in his account. The user then clicks on the 'Payment Management' link to pay bills securely using their blockchain wallet. The system allows users to enter bill payment details, specify the amount, and confirm the payment using smart contract execution. In this instance, the user pays 200 coins, which is deducted from their balance. The 'View Balance' section displays all transactions, ensuring complete transparency and accuracy in financial operations.

V. CONCLUSION:

In conclusion,the proposed decentralized banking system using blockchain technology ensures secure, transparent, and efficient financial transactions without reliance on traditional banking intermediaries. By leveraging Ethereum smart contracts, Web3 integration, and cryptographic security, the system enables users to manage wallets, transfer funds, and process payments while ensuring data integrity. The immutability of blockchain prevents fraudulent modifications, and real-time transaction tracking enhances user trust. The automation of financial services through smart contracts significantly reduces processing time and costs, making digital banking more accessible, decentralized, and efficient. This system demonstrates the potential of blockchain in revolutionizing banking operations, addressing security and efficiency challenges faced by traditional systems.

VI. FUTURE WORK:

For future work, this system can be enhanced by integrating AI-driven fraud detection, cross-chain interoperability, and decentralized identity verification to further strengthen security and user privacy. Implementing Layer 2 scaling solutions like Polygon or Lightning Network can improve transaction speed and reduce gas fees. Additionally, the system can expand to support decentralized finance (DeFi) applications, allowing users to access lending, borrowing, and staking services directly from the platform. By integrating regulatory compliance measures and multi-chain support, the system can evolve into a fully scalable and legally compliant decentralized banking solution, bridging the gap between traditional and digital finance.

VII.References:

1.Zhang Y, Chen X, Li J, Wong D, Lee P, Lou W. Ensuring location-based access control for cloud-stored data with fully outsourced policy hiding. IEEE Transactions on Information Forensics and Security. 2016;11(8): 1941-1955.
2.Wadhwa S, Sahoo S. Application of blockchain technology in banking: a systematic literature review. International Journal of Critical Accounting. 2024;15(3): 281-292.
3.Stoica EA, Sitea DM. Blockchain disrupting fintech and the

banking system. Proceedings. 2021;74(1): 24.
4.Zhang Y, Chen Z, Sun Y, Liu Y, Zhang L. Blockchain network analysis: a comparative study of decentralized banks. arXiv preprint arXiv:2212.05632. 2022.
5.Syarkani Y, Subu MA, Waluyo I. Revolutionizing financial risk management: blockchain's role in transforming global banking systems. Moneta: Journal of Economics and Finance. 2024;2(4): 143-157.
6.Kumar R, Tripathi R. Securing online banking transactions using blockchain technology. Journal of Banking and Financial Technology. 2023;7(2): 101-115.
7.Liang X, Shetty S, Tosh D, Kamhoua C, Kwiat K, Njilla L. ProvChain: A blockchain-based data provenance architecture in cloud environment with enhanced privacy and availability. In: Proceedings of the 17th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGRID). 2020. p. 468-477.
8.Puthal D, Malik N, Mohanty SP, Kougianos E, Yang C. The blockchain as a decentralized security framework [future directions]. IEEE Consumer Electronics Magazine. 2020;9(2): 18-21.
9.Al-Jaroodi J, Mohamed N. Blockchain in industries: A survey. IEEE Access. 2020;7: 36500-36515.
10Casino F, Dasaklis TK, Patsakis C. A systematic literature review of blockchain-based applications: current status, classification and open issues. Telematics and Informatics. 2020;36: 55-81.
11.Zheng Z, Xie S, Dai HN, Chen X, Wang H. Blockchain challenges and opportunities: a survey. International Journal of Web and Grid Services. 2020;14(4): 352-375.
12.Xu X, Weber I, Staples M, Zhu L, Bosch J, Bass L, Pautasso C, Rimba P. A taxonomy of blockchain-based systems for architecture design. In: Proceedings of the 2017 IEEE International Conference on Software Architecture (ICSA). 2020. p. 243-252.
13.Yli-Huumo J, Ko D, Choi S, Park S, Smolander K. Where is current research on blockchain technology?—a systematic review. PloS one. 2020;11(10): e0163477.
14.Swan M. Blockchain: Blueprint for a new economy. O'Reilly Media, Inc.; 2020.
15.Nakamoto S. Bitcoin: A peer-to-peer electronic cash system. Manubot; 2020.
16.Tapscott D, Tapscott A. Blockchain revolution: how the technology behind bitcoin is changing money, business, and the world. Penguin; 2020.
17.Pilkington M. Blockchain technology: principles and applications. In: Research handbook on digital transformations. Edward Elgar Publishing; 2020. p. 225-253.
18.Underwood S. Blockchain beyond bitcoin. Communications of the ACM. 2020;59(11): 15-17.
19.Nofer M, Gomber P, Hinz O, Schiereck D. Blockchain. Business & Information Systems Engineering. 2020;59(3): 183-187.
20.Iansiti M, Lakhani KR. The truth about blockchain. Harvard Business Review. 2020;95(1): 118-127.