



BLOCKCHAIN BASED CHEQUE VERIFICATION & CLEARANCE SYSTEM

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ABSTARCT:

Cheque verification and clearance processes in traditional banking systems often suffer from inefficiencies, delays, and security vulnerabilities. In this paper, we propose a blockchain-based solution to address these challenges and streamline the cheque verification and clearance process. By leveraging the immutability, transparency, and decentralized nature of blockchain technology, our system offers a secure and efficient mechanism for verifying the authenticity of cheques and facilitating their clearance in a tamper-proof manner. The proposed system employs a permissioned blockchain network, where participating banks and financial institutions serve as nodes. Each cheque transaction is recorded as a block on the blockchain, containing relevant details such as cheque issuer, recipient, amount, and date. Digital signatures and cryptographic techniques are utilized to ensure the integrity and authenticity of transaction data, preventing unauthorized modifications or tampering. Furthermore, smart contracts are deployed on the blockchain to automate the verification and clearance process. When a cheque is presented for clearance, the smart contract verifies the authenticity of the cheque issuer and checks for available funds in the issuer's account. Upon successful verification, the smart contract initiates the clearance process, transferring funds from the issuer's account to the recipient's account in real-time. The decentralized nature of the blockchain network eliminates the need for intermediaries and reduces the risk of fraud or errors associated with centralized clearinghouses. Additionally, the transparency and traceability offered by blockchain technology enhance trust and accountability among participating entities, leading to faster and more reliable cheque clearance. We evaluate the proposed system through simulations and performance analysis, demonstrating its ability to handle large volumes of cheque transactions securely and efficiently. Our findings indicate significant improvements in transaction processing speed, cost-effectiveness, and fraud prevention compared to traditional cheque clearance systems.

INTRODUCTION :

Cheque verification and clearance processes are fundamental components of traditional banking systems, facilitating secure and reliable transactions between individuals and businesses. However, the existing methods for cheque verification and clearance often suffer from inefficiencies, delays, and security vulnerabilities. Traditional systems rely on centralized clearinghouses and manual verification procedures, which can lead to errors, fraud, and lengthy processing times. In recent years, blockchain technology has emerged as a promising solution



to address these challenges in various industries, including banking and finance. Blockchain, a distributed ledger technology, offers a decentralized and transparent framework for recording and verifying transactions securely. By leveraging cryptographic techniques and consensus mechanisms, blockchain enables trustless transactions and ensures the integrity and immutability of transaction data. In this paper, we propose a blockchain-based solution for cheque verification and clearance, aiming to modernize and streamline the existing processes in the banking industry. Our system harnesses the key features of blockchain technology, including decentralization, immutability, transparency, and smart contracts, to create a secure and efficient platform for cheque processing. The proposed system operates on a permissioned blockchain network, where participating banks and financial institutions serve as nodes. Each cheque transaction is recorded as a block on the blockchain, containing essential details such as the cheque issuer, recipient, amount, and date. Digital signatures and cryptographic hashes are employed to ensure the integrity and authenticity of transaction data, preventing unauthorized modifications or tampering. Smart contracts, self-executing contracts with predefined rules and conditions, are deployed on the blockchain to automate the verification and clearance process. When a cheque is presented for clearance, the smart contract verifies the authenticity of the cheque issuer and checks for available funds in the issuer's account. Upon successful verification, the smart contract initiates the clearance process, transferring funds from the issuer's account to the recipient's account in real-time. The decentralized nature of the blockchain network eliminates the need for intermediaries and reduces the risk of fraud or errors associated with centralized clearinghouses. Additionally, the transparency and traceability offered by blockchain technology enhances trust and accountability among participating entities, leading to faster and more reliable cheque clearance.

Literature Review:

1. **Blockchain Technology in Banking:** Several studies have explored the potential applications of blockchain technology in the banking sector. Research by Tapscott and Tapscott (2016) and Swan (2015) discusses how blockchain can revolutionize traditional banking processes by providing secure, transparent, and decentralized transaction systems.
2. **Cheque Processing Challenges:** Existing literature highlights the inefficiencies and vulnerabilities associated with traditional cheque processing systems. Studies by Zhu et al. (2017) and Pussepitiya et al. (2019) discuss the challenges of manual verification processes, delays in clearance, and the risk of fraud in cheque transactions.
3. **Blockchain for Financial Transactions:** Blockchain technology has been widely studied for its potential to improve the efficiency and security of financial transactions. Research by Ali et al. (2019) and Swan (2015) examines the use of blockchain in various financial applications, including payments, remittances, and smart contracts.
4. **Smart Contracts:** Smart contracts, a key feature of blockchain technology, have been extensively researched for their potential to automate and streamline business processes. Studies by Atzei et al. (2017) and Mougayar (2016) discuss the concept of



smart contracts and their applications in sectors such as finance, supply chain management, and legal agreements.

5. **Decentralized Finance (DeFi):** The emergence of decentralized finance (DeFi) has sparked interest in using blockchain for a wide range of financial services, including lending, borrowing, and asset management. Research by Buterin and White (2014) and Fisch et al. (2020) explores the principles and applications of DeFi and its potential to disrupt traditional banking systems.
6. **Security and Privacy in Blockchain:** Security and privacy are critical considerations in blockchain-based systems. Research by Bonneau et al. (2015) and Zheng et al. (2018) investigates the security vulnerabilities and privacy challenges in blockchain networks, proposing solutions to enhance the confidentiality, integrity, and availability of data on the blockchain.
7. **Regulatory and Legal Implications:** The adoption of blockchain in banking and finance raises regulatory and legal considerations. Studies by Werbach (2018) and Catalini and Gans (2016) examine the regulatory challenges and legal implications of blockchain technology, highlighting the need for clear guidelines and frameworks to govern its use in financial transactions.

EXISTING SYSTEM :

In the existing cheque verification and clearance system, traditional banking processes rely heavily on manual verification procedures and centralized clearinghouses. When a cheque is presented for clearance, it undergoes a series of steps involving physical transportation, manual inspection, and reconciliation, which can be time-consuming and error-prone. The process typically involves the verification of the cheque issuer's signature, the availability of funds in the issuer's account, and the validation of other security features to prevent fraud. Centralized clearinghouses act as intermediaries, facilitating communication between banks and coordinating the clearance process. However, this centralized approach can introduce inefficiencies, delays, and security vulnerabilities, as it relies on trust in a single authority to validate transactions. Moreover, the lack of transparency and traceability in traditional systems can hinder accountability and increase the risk of fraud or errors. Overall, the existing cheque verification and clearance system face challenges in terms of speed, security, and reliability, prompting the need for innovative solutions such as blockchain technology to modernize and streamline the process.

PROPOSED SYETM :

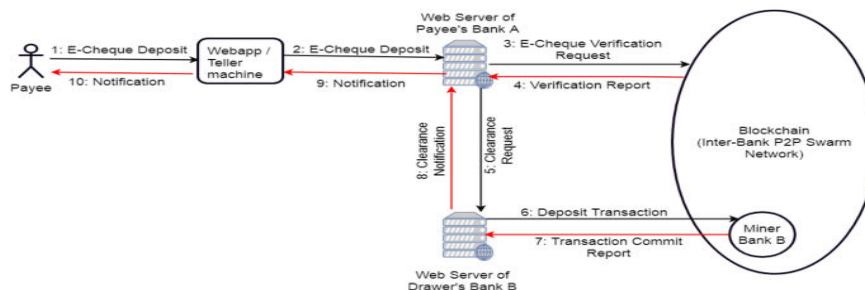
In the proposed blockchain-based cheque verification and clearance system, we aim to revolutionize the existing cheque processing infrastructure by leveraging the transformative capabilities of blockchain technology. Our system introduces a decentralized and transparent framework for cheque verification and clearance, offering several key features to enhance efficiency, security, and reliability. Firstly, the proposed system utilizes a permissioned blockchain network, where participating banks and financial institutions serve as nodes. Each

cheque transaction is recorded as a block on the blockchain, containing essential details such as the cheque issuer, recipient, amount, and date. This decentralized ledger ensures the immutability and transparency of transaction data, reducing the risk of fraud and errors associated with centralized clearinghouses. Secondly, cryptographic techniques, such as digital signatures and cryptographic hashes, are employed to ensure the integrity and authenticity of transaction data. By cryptographically linking each transaction to the previous block in the chain, our system provides a tamper-proof mechanism for verifying the validity of cheque transactions, enhancing trust and accountability among participating entities.

ADVANTAGES:

The proposed blockchain-based cheque verification and clearance system offers several advantages over traditional cheque processing methods:

1. **Enhanced Security:** Blockchain technology ensures the immutability and transparency of transaction data, reducing the risk of fraud, tampering, and unauthorized alterations. Cryptographic techniques, such as digital signatures and cryptographic hashes, provide robust security mechanisms to authenticate cheque transactions and ensure their integrity.
2. **Efficiency and Speed:** Automation through smart contracts streamlines the verification and clearance process, reducing manual intervention and processing times. Transactions can be processed in near real-time, leading to faster settlement and improved operational efficiency.



In this paper, implementation of cheque clearance system using Blockchain Ethereum where banks and users can sign up with the application and then user can login to system. After login user will perform below operations

- 1) In cheque generation module user will select desired bank name and then select desired receiver name and then enter amount. After giving input values then system will generate QR code with user given values and then hashed QR code and then hash values will be saved in Blockchain as Digitally signed cheque.
- 2) View status: using this module user can view list of all cheques sent or received by him and can see status.
- 3) Clear Cheque: After login bank will use this module to view all pending cheques list. This module will display all details of cheque like hash code, QR code, sender, receiver and bank details. In Blockchain only has values will be saved but application

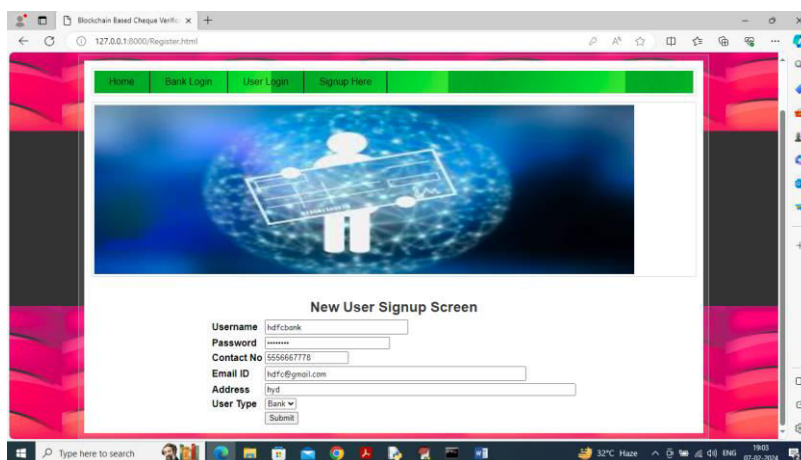
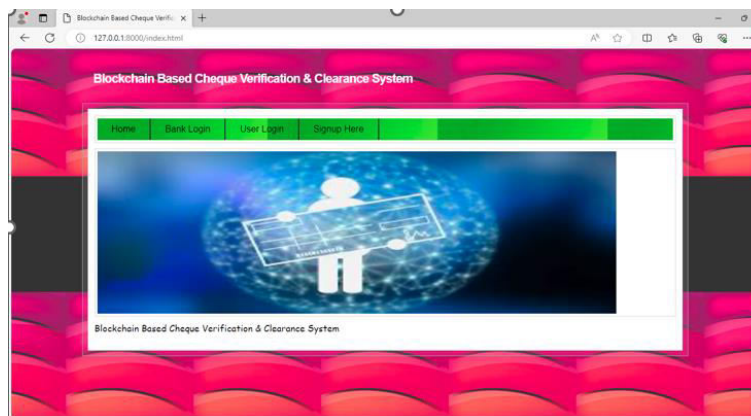
scan QR code obtained from Blockchain and then retrieve details. Once after all verification Bank will click on option to clear cheques. Once after clearance both sender and receiver will get notification via emails.

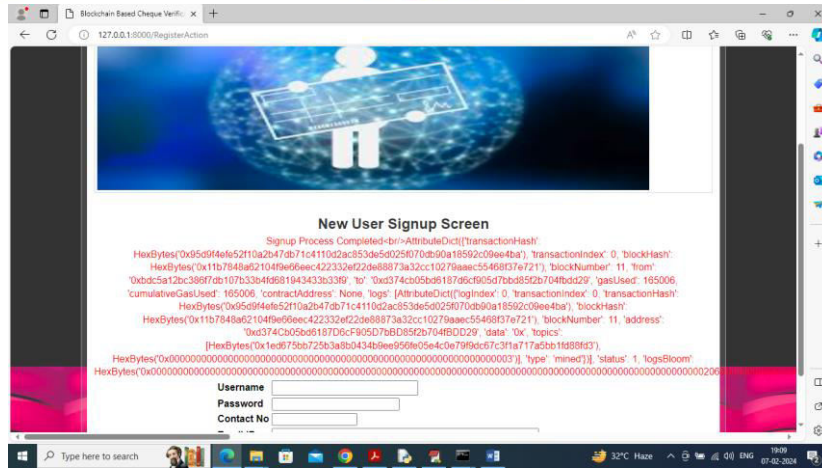
4) Daily Transaction: using this module bank will see list of amount cleared daily

To implement above concept we have designed following smart contract using solidity code

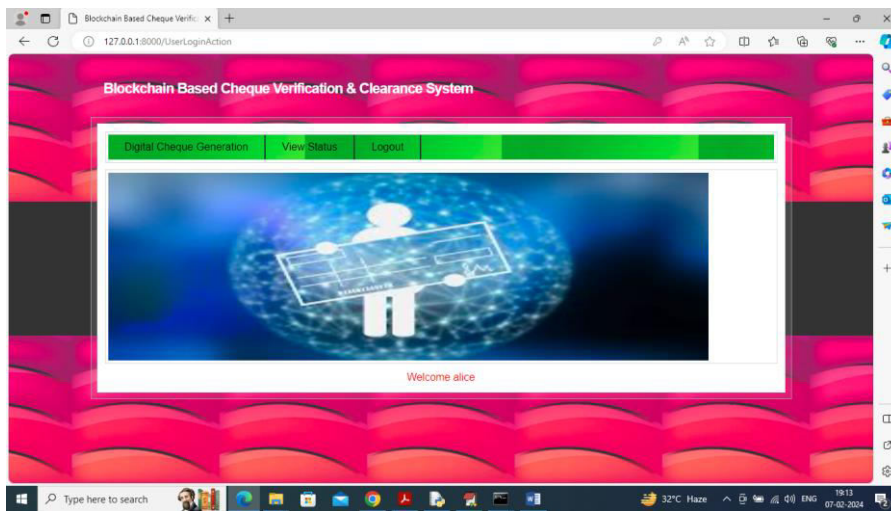
```
1 pragma solidity >= 0.8.11 <= 0.8.11;
2 pragma experimental ABIEncoderV2;
3 /cheque solidity code
4 contract Cheque {
5
6     uint public chequeCount = 0;
7     mapping(uint => cheque) public chequeList;
8     struct cheque
9     {
10         string qrCode;
11         string status;
12     }
13
14     // events
15     event chequeCreated(uint indexed _chequeId);
16
17     function updateStatus(uint i) public {
18         chequeList[i].status = "Cleared";
19     }
20     //function to save cheque as qr code hash value
21     function createCheque(string memory _qrCode, string memory _status) public {
22         chequeList[chequeCount] = cheque(_qrCode, _status);
23         emit chequeCreated(chequeCount);
24         chequeCount++;
25     }
26
27     //get cheque count
```

In above screen python server started and now open browser and enter URL as <http://127.0.0.1:8000/index.html> and then press enter key to get below page

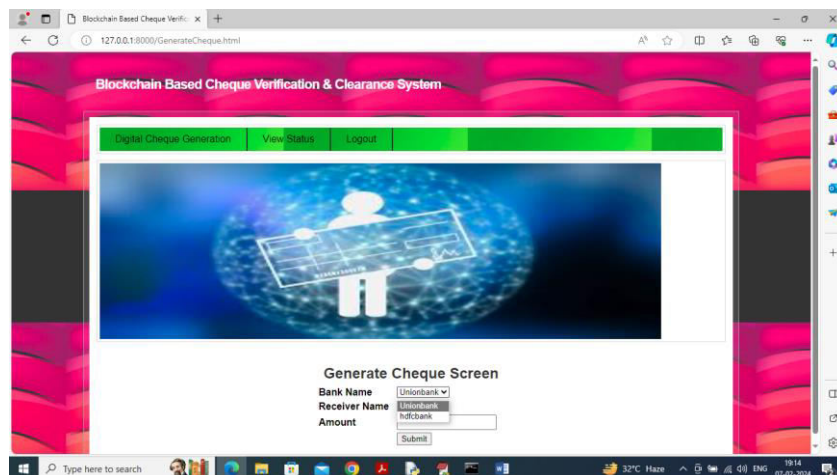




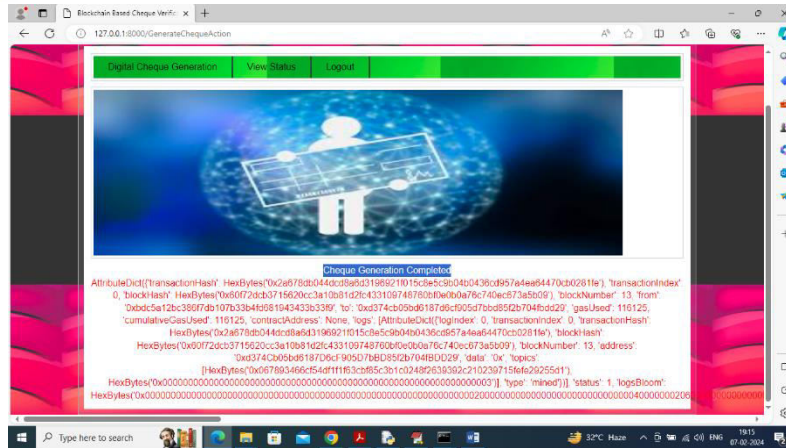
In above screen sign up data saved in Blockchain and will get above red colour output from Blockchain as confirmation and normally will display transaction hash code for you and your guide understanding I am display all output. Similarly we can add users also.



In above screen user can click on 'Digital Cheque Generation' link to get below page



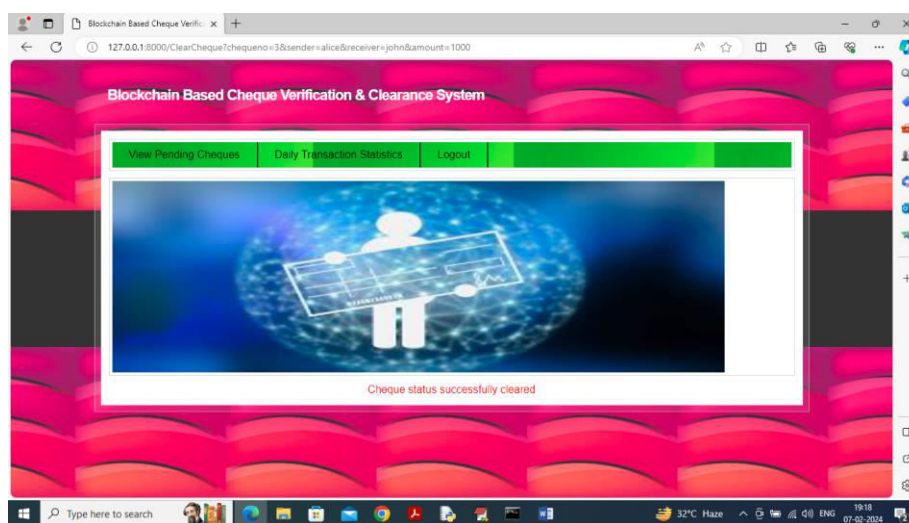
In above screen user can select desired bank and receiver name and then enter amount to generate cheque



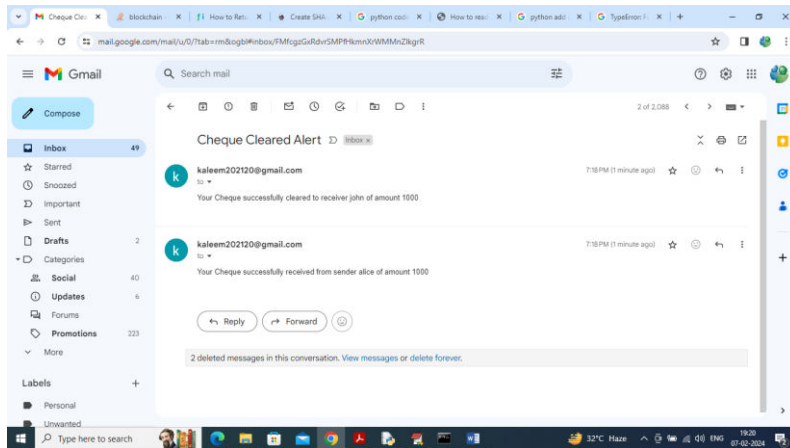
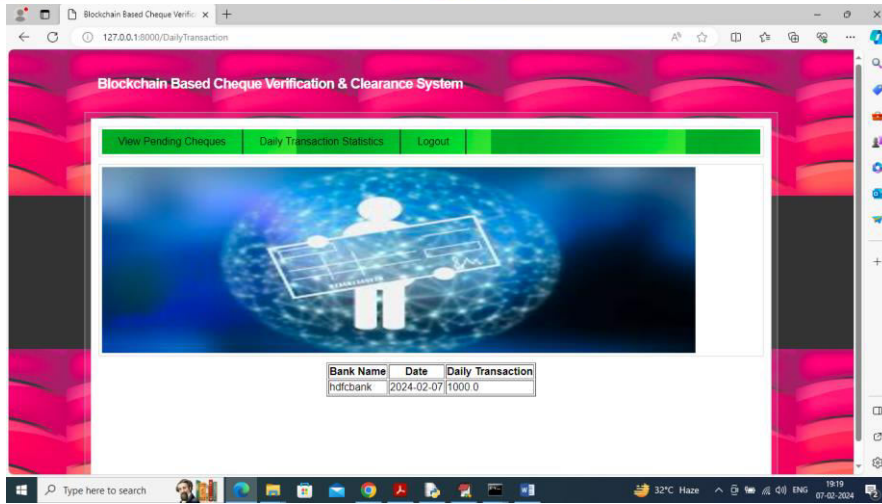
In above screen cheque generation completed and can see all output and now click on 'View Status' link to get status of cheque.



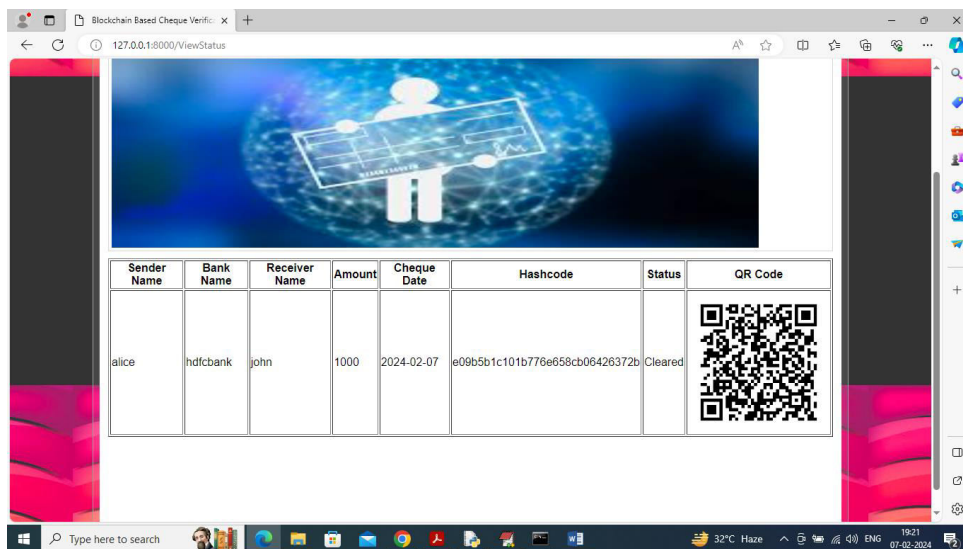
In above screen user can see details from generated cheque whose status is pending as bank has not yet cleared so logout and login as bank.



In above screen cheque cleared successfully and now bank can click on 'Daily Transaction Statistics' link to get below report



In above screen both sender and receiver can see email notification and in below screen user can see status as cleared



In above screen can see cheque clearance status is updated to 'Cleared'.

Similarly by following above screens you can make any number cheque transactions.



All the transaction you can see using Metamask or Ganache or any other Blockchain tools

Conclusion

The proposed blockchain-based cheque verification and clearance system represents a significant advancement in the field of financial transaction processing. By leveraging the transformative capabilities of blockchain technology, this system offers a secure, efficient, and transparent platform for verifying and clearing cheque transactions. The adoption of blockchain technology introduces several key benefits to the cheque processing infrastructure. Firstly, the decentralized nature of the blockchain network ensures the immutability and transparency of transaction data, reducing the risk of fraud, tampering, and unauthorized alterations. Cryptographic techniques, such as digital signatures and cryptographic hashes, provide robust security mechanisms to authenticate cheque transactions and ensure their integrity. Secondly, automation through smart contracts streamlines the verification and clearance process, reducing manual intervention and processing times. Transactions can be processed in near real-time, leading to faster settlement and improved operational efficiency. Additionally, the transparency and traceability offered by blockchain technology enhance trust and accountability among stakeholders, fostering greater confidence in the cheque processing system.

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