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ORIGINAL RESEARCH

# Hyperledger Fabric Networks for Corporate Remittance Payments in the Banking Sector Using Blockchain

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**Abstract**
Blockchain is a magnificent technology that could decentralize data and information management, distribution, and storage. With the implementation of blockchain technology, Current corporate operations should be improved to make them more accountable, transparent, secure, and efficient. The banking industry was one of the first to gain from this technology's disruptive potential. For regulatory compliance, Payments to corporations in the exchange of documents and partie's information are required by the banking sector. Additionally, compared to retail remittances (payments made between people or from a company to a person), they are more likely to involve fraud and other illegal activity. Blockchain technology is, therefore, appropriate for allowing such payments. It makes it possible for financial institutions and banks to share real-time compliance and anti-money laundering (AML) data on remittance requests and the people making them. Traditional payment methods require reconciliation, which takes time and money. Distributed ledger technology does not require reconciliation. All nodes of the payment network receive real-time replications of all transactions submitted to the distributed ledger. A Hyperledger fabric network with four peers and a two-participant organization remittance network has been created and built in this research effort. In the remittance channel, each member represents a bank. Each bank has a corporate customer to transmit and receive payments on this network. An Interplanetary File System (IPFS) network was set up between the two banks to share documents and other artifacts. The system supports corporate remittance between two bank organizations using distributed ledger technology. The Apache JMeter tool evaluated the network's performance for several transactions. Execution time, latency, and throughput are among the assessment measures.

**Keywords** Blockchain · Corporate remittance · Hyperledger fabric · IPFS network · Distributed ledger

## Introduction

Remittances are usually defined as a convinced amount of money sent frequently to families in their home nation state by their relatives or migrants. This money is often used to improve food, health care, education, and housing and to lift whole communities out of poverty [1]. Migrant's remittances to developing countries have surged tenfold in the last decade, outpacing the growth in the number of individuals traveling to developing countries [2]. Research on remittances is abundant, and it has gone from being a neglected issue to becoming an essential instrument for growth [3]. Sending money home by migrants is the most apparent way that individuals can contribute to the sustainable growth goals established by the United Nations [4]. This fact is highlighted in the 2030 plan for sustainable improvement as the primary instrument that can be used to promote inclusive expansion in countries of origin, transit, and location [5]. Since the beginning of this decade, blockchain technology has been in the spotlight for its potential to transform various industries, particularly the financial services sector [6]. It genuinely has the potential to disrupt existing companies in the banking industry and seize market share from assets managed to lend. The remittance industry is an ideal blockchain implementation candidate [7]. Even huge remittance companies

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like Western Union have realized that adopting blockchain technology is essential to remain competitive in the future [8]. There has been a 51% rise in the total volume of remittances sent to poor nations worldwide during the past ten years. The World Bank forecasts that remittances topped $528 billion in 2018, up 10.8% from 2017 [9]. One billion individuals worldwide send and receive money yearly, resulting in $550 billion of transactions [10]. About 40% of entire remittances return to rural areas, with an average monthly remittance of €200 per person [11]. Notably, there is a degree of interest in Blockchain technology among corporations, industries, and the government. Distributed ledger technology has four key application areas [12]. Finances, payments, remittances, securities, and financial instruments, as well as money Title, register for real estate, land, and automobile Deals (business contracts, licensing, registration, commitments made by partnerships, wills and trusts, and intellectual property registration), identity documents (driver's licenses, passports, visas, and birth certificates). In our research, we have pioneered a comprehensive framework for corporate remittance management, integrating cutting-edge technologies and novel methodologies to streamline the remittance process between financial institutions. Our approach encompasses several innovative elements, notably utilizing Hyperledger Fabric for network establishment and treating individual banks as nodes to enhance network security and efficiency. Additionally, our development of a bespoke smart contract, the corporate remittance chain code, stands as a novel contribution, facilitating seamless remittance transactions while ensuring transparency and accountability through blockchain transaction retrieval. Moreover, our deployment of private IPFS networks between participating banks represents a novel approach to secure document exchange, mitigating potential risks associated with traditional channels. Furthermore, integrating a backend node server, adept at communicating with diverse systems, including the blockchain network, PostgreSQL databases, IPFS networks, and frontend applications, embodies a novel strategy to centralize and streamline remittance processing. Through these innovative methodologies, our research endeavors to revolutionize corporate remittance management, offering a robust and efficient solution to financial institutions grappling with the complexities of cross-border transactions.

In this paper, the remittances are money sent home to family. This money is used to improve nutrition, healthcare, education, and housing and lift communities from poverty. Technology for remittances must be enhanced so that many of the issues that now exist, like transaction accessibility and the exchange of legal records, can be avoided. Because of this, blockchain technology has been determined to be a viable option for processing this kind of payment. The blockchain network, which can make payments and keep records, represents every option that is now available. The architecture of blockchain technology has a significant impact on conventional remittance techniques. As a direct consequence, it is now possible to make payments to third parties in a manner that is more open, honest, and dependable. It is feasible to conduct financial transactions on a global scale by utilizing a distributed network of computers.

## Contribution

The proposed system has improved accountability, transparency, security, and efficiency.

- We have deployed the blockchain to distribute compliance and anti-money laundering (AML) data in remittance transactions.
- We have proposed an interplanetary file system (IPFS) for distributing the transaction files between the corporations.
- The assessment was done on the Apache JMeter to check the network's performance using the parameters execution time, latency, and throughput.

Section "Introduction" introduces blockchain, whereas Sect. "Related Work" addresses the literature survey and its outcomes. Section "Methodology to Implement Blockchain in Remittance" details the methodology for implementing blockchain in remittance, and Sects. "Performance and Evaluation" and "Conclusion" conclude the paper with implementations of the blockchain process flow.

## Related Work

In this section, we present the preliminaries and similar work done on blockchain technology.

## Blockchain

A blockchain is a specific Decentralized Ledger Technology (DLT) memory system that stores digital information while maintaining its history. The following essential components form the basis of DLT [13]:

Distributed database—Each node in the system has unique copies of the transaction record and the other material on the block. When a new transaction is submitted, all the nodes on the network are brought up to date [14]. Peer-to-peer transmission—There is no unique location where data can be stored, like a server. Instead, participants in the network are responsible for recording and exchanging information with one another [15].

i. Trust—The community can confirm that a fresh record is generated.

ii. Transparency—Those who have access to the ledger can see the history of transactions.
iii. Immutable records—No person can change the truthfulness of the details.
iv. Embedded logic—Allows process automation, techniques, and rules to start transactions between nodes instantly.

A digital ledger or record of transactions is at the heart of blockchain technology. The distributed database manages an increasing list of content entries or blocks cryptographically connected on a chain. These blocks can be thought of as individual entries [16]. The details of the blockchain with a flow chart are shown in Fig. 1. The classification of blockchains based on their applications is mentioned in Table 1. Mutua and Mwikya [17] have given a study on the quality of services provided to mobile users in Kenya. For instance, all member deal records are included in the decentralized scheme in a basic blockchain architecture. Although AES data encryption is a more attractive and theoretically complex cryptographic method, its main benefit is that it comes with various key lengths. Compared to DES, which only enables you to choose a key size of 56 bits, AES is suggestively extra secure as it lets you select a key length of 128 bits, 192 bits, or 256 bits. AES is a fast, reliable encryption procedure that protects data from unwanted access. The following is the AES formula in mathematics [28].

$$(x) = \sum_{i=0}^{d} ci \prod_{j=0}^{d} j \neq i\left(\frac{x - p_j}{p_i - p_j}\right)$$

**Table 1** Classification of Blockchain Technology and its Applications

| Blockchain technology | Ethereum | Hyperledger fabric |
|---|---|---|
| The Goal | Employed for smart deals | deployed blockchain technologies for fabric industries |
| Data Storage Types | The transition of Cryptocurrency smart contract history | Chain-code and intelligent contract transactions |
| Used languages | Solidity Serpent | Go |
| Choice of eco-system | Open | Constrained |
| Block Release mapping | 12 s | Configurable |
| Size of transactions | No upper bound | Configurable |
| Rate Of Transactions | No upper bound | > 10,000 TNX/s |
| Mining | Need Proof of work using the Ethash algorithm | Not applicable |

$$\omega \mapsto \sum_{i=0}^{7} \lambda_i \omega^{-2^i}$$

Emerging technologies in the industry include blockchain. Blockchain technology can make present corporate procedures more self-governing, apparent, secure, and productive. The funding sectors are the first to move quickly to capitalize on the potentially disruptive capabilities of this technology. One of the world's most complex bank payment systems is the Indian banking system. Transactions are now slow and challenging due to the infrastructure's centralized design, created on a real-time gross payment organization

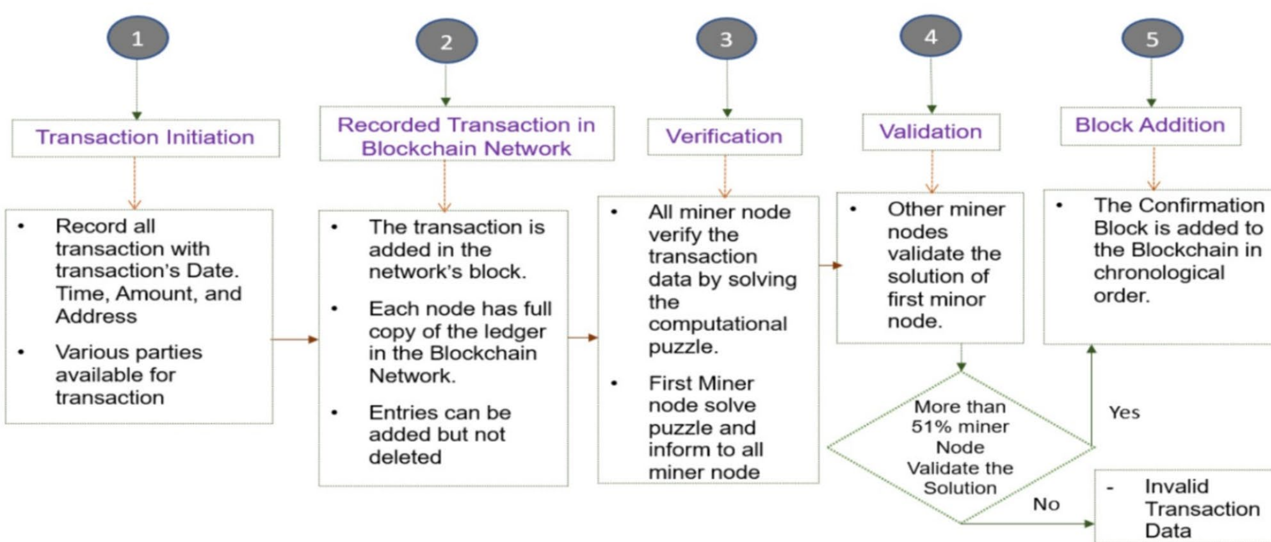


**Fig. 1** Working on Blockchain [40]

used by Indian banks. In terms of security and recovery, it also costs a lot. This system must be secure, reliable, and effective [34]. Moving from old-style systems to blockchain stages is not the most important thing. Instead, the main idea is to make a scheme that provides care, confidentiality, and a distributed way to lend money. Expanding the distributed ledger knowledge, the system supports diverse facilities comprising money deposits, transfers, loan checking, etc. [26]. The researchers have proposed a remote-sensing image integrity authentication method based on blockchain and perceptual hash to address security concerns in storing and transmitting the original perceptual hash value [27]. A summary of previous studies is summarized in this section. A wide range of authors used the technique and presented their discoveries. The number of customers participating in mobile money transfers has risen over time due to the growing popularity of the brand brought by the various players. This research was performed with the overarching purpose of deciding the point to which brand equity plays a role in the customer decision-making process for mobile money transfers. This research investigated how customer brand devotion and brand name knowledge might affect decision-making regarding Airtel Kenya phone money transfers. The learning relied heavily on the Consistency model as its foundation, with assistance coming from Unified Theory. The responses were chosen at random using a process called random sampling. According to the study's findings, there is a significant and favorable association between consumer brand name consciousness and the decision-making process of consumers [18]. Over the past several years, remittance payments have become increasingly important in global trade settlements. However, very little research is being done on remittance payments. Through the development of a model for payment forecasting, the tenacity of this study is to evaluate the features that influence remittance-related international trade payments. A binominal logistic regression model was used to investigate the aspects affecting the exporter's payment approach for international business deals. The chance of selecting advance remittance was reduced as trader's trade commands rose, but the likelihood of choosing it increased when exporters had previous experiences with non-recovery of payments. Ultimately, it concluded that there remained a better chance of post-export transfer when the total amount exported was substantial and the purchaser had a trustworthy reputation [19]. Several frameworks, like the commercial value-added and digital conversion frameworks, emphasize blockchain deployment's impact on the supply chain's digital conversion. The actions of the supply chain that are enabled by blockchain result in the development of various supply chain abilities, an increase in the productivity and efficacy of the supply chain, and economic advantages. The study found obstacles to overcome when deploying blockchain technology in supply chains.

The outcomes of this study are not restricted to the distribution networks of the food or drug companies since they are generalizable to other distribution networks and industries, which frequently share traits in common with the sectors. While this work makes significant contributions, theoretically and practically, it has several limits that open the door to other lines of inquiry [20]. Using Artificial Intelligence (AI) in finance or treasury maintenance presents unique challenges. This is because most treasury features are no longer tangible but digital processes that are increasingly highly automated. Most members working in finance or treasury groups are information workers who make judgments and conduct analytics within frequently fluid frameworks and must consider environmental factors. AI in the financial and treasury sectors is most comparable to the intricacy of the human nervous system because it involves a lot more than just the automation of processes. The AI network neural framework has been enhanced and is now broadly utilized in various fields related to treasury management. Some of these fields include the early alert of potential financial crises, diagnosis of economic risk, control of financial data quality, mining of concealed financial data, etc. [21]. It can be concluded that the major causes that influence the implementation of blockchain technologies in banking services are interpreted compatibility, perceived expenses, relative advantage, perceived safety, firm scope, legislative policies, and consumer readiness [22]. An actual architecture of Condition Anonymous Payment (CAP) based on the suggested technique for the signature of knowledge showed that it is secure within the described security model. It created the Decentralized Conditional Anonymous Payment (DCAP) by building off the planned CAP and proved how it could meet the necessary security criteria. It compared its results to Zero Cash, tested in the same settings, and found that it performed better than the prototype. The findings seemed to indicate that the plan is feasible for implementation in real-world settings. One of the next things that needs to be done is to team up with a real-world company to tailor the plan and implement the situation in a real-world environment. This would also allow us to determine whether new features or attributes are essential for future versions to incorporate [23]. Combining private and public blockchains can create an innovative hybrid blockchain architecture. This would allow critical offers to be launched on a private blockchain, from which only the auctioneer could learn the bids and no one else. At the same time, it allows blockchains to publish the announcement of the auction winner and then ensure that payments are responsible. In addition, it demonstrated how to promote straight behavior among the participants in the auction by utilizing smart contracts placed on public blockchains. Empirical research demonstrates that this structure is more effective in terms of its path time and its financial rate when compared to implementations of auctions based only on public blockchains [24]. A mutually secured e-wallet design has been made based on digital ledger technology (DLT), which uses blockchain. The architecture that has been suggested is the first of its type to integrate blockchain technology for electronic wallets. In addition to this, it presents the framework for compatibility between e-wallets issued by various banks or other businesses. The suggested approach would lessen the stress placed on the bank's Central Processing Units (CPUs) and the load placed on the servers, and it would decentralize the dispensation actions, maximizing the idle capabilities at extra centers. Table 2 compares the reviewed literature of different authors [25]. To provide a decentralized and reliable online review and rating platform, a Blockchain-based Online Education Content rating system has been developed. Subject Matter Experts (SMEs) do independent and impartial content assessments, and the system guarantees the integrity of ratings [35]. The diffusion prediction model that has been suggested predicts the number of new cases that will occur over the following 4 weeks. This includes projections for confirmed cases, recoveries, deaths, and active cases. With the continuing epidemic, this model is useful for government preparedness in handling possible spikes. Accuracy and error rates are used to evaluate performance, and the outcomes are compared to predictions from logistic regression models, support vector machines, and convolutional neural networks. The results verify the effectiveness of the suggested model [36]. This work aims to improve the efficiency of data storage in blockchain (BCT) blocks by introducing a new way to store an index that points to real data. This creative approach increases operational efficacy while also conserving storage space. Additionally, it simplifies locating possibly harmful or malfunctioning nodes dispersed throughout different regions and oversees data collection within the allotted period [37]. Computer vision technology, utilized for object detection in complex situations, often combines many critical technologies, including digital image processing, artificial intelligence, and pattern recognition. Recent research has shown that the You Only Look Once (YOLO) method combined with Fast Convolutional Neural Networks (CNNs) is useful for managing motion, resolving low picture quality, and differentiating between similar items. The purpose of this suggested study is to address these issues by putting three different object identification algorithms into practice: Faster Region-Based Convolutional Neural Networks (R-CNN), Single Stage Detector (SSD), and You Only Look Once (YOLO) [38, 39]. The researchers proposed a system for emergency access to the hospital's patient data. They used EEG signals and compressive sensing methodology to implement the proposed scheme [41]. In [42], the authors

**Table 2** Comparison of the reviewed literature

| Reference | Algorithm for security | Total computational time(s/MS) | Protocol | Framework | Limitation |
|---|---|---|---|---|---|
| H. Xiong et al. [30] | Elliptic Curve Discrete Logarithm Problem (ECDLP) | On average, a mining time of 87.211 MS is required, | Consensus | Ethereum | I fixed the block release timing to 12 s because it's using Ethereum |
| Razzaq, A [29] | Advanced Encryption Standard (SHA-256) | Taking time 240 s in mining big data | IPFS | Ethereum TEST-NET blockchain | Threats to internal validity will impact the system's performance; security for data verification can be improved |
| Bhujel [31] | The Elliptic Curve Digital Signature Algorithm (ECDSA) | Not Applicable | Consensus | Ethereum | High transaction costs and security concerns: NFTs are stored on the blockchain, which is theoretically immutable, but there are still chances of hacking and stealing them |
| Jiang, Y [32] | the elliptic curve encryption algorithm | Not Applicable | IPFS | Ethereum | Data verification and efficiency can be improved |
| Tsepeleva, R. [33] | GRANDPA consensus algorithm | The time for evaluation of the transaction is not evaluated | cross-chain interaction protocol | Ethereum | Future work might include improving and optimizing this design |
| Proposed work | SHA-256 | 14 MS | IPFS | Hyperledger Fabric | |

explored the diverse fields for the maximum utilization of the concept of Blockchain. They have comprehensively studied the diverse consensus mechanisms based on the different parameters. An empirical study of the usage of ECC with blockchain in the field of IoT is presented by [43]. The technology is revolutionizing rapidly with the growth of online healthcare record storage and access to patient data. The authors have tried accumulating the concept of blockchain with the IoT to make it smart [44].

Based on the outcomes of Table 2, it was identified that researchers have explored and addressed the security problem and lack of financial ecosystems. Still, the solution is useless as essential data can be lost if the proposed method is followed. Further, work on protection can be expected since the banks have agreed to partner, and each of them must ensure that any fraudulent behavior does not directly or implicitly affect their database and transactions. Determining the application of oversight functions for the government financial supervisory unit is essential. The blockchain-based money collection supervision scheme is not just for customers and merchants who invest and obtain digital currencies but for the bank's social supervision unit to inspect digital money transfers to raise economic activity. In this paper, we have created a blockchain network that can be used to settle corporate remittances among banks and to develop a Hyperledger fabric network and Interplanetary File System (IPFS) network to distribute documents among banks. Also, the bank database must be established, and the remittance application that can utilize this framework must be developed.

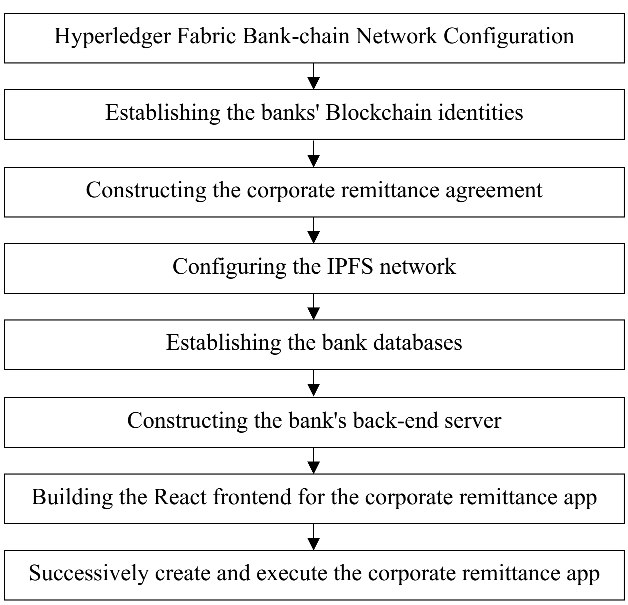


**Fig. 2** Process flow of blockchain

## Methodology to Implement Blockchain in Remittance

The blockchain implementations in the remittance are described and shown in the process flow shown in Fig. 2. This section describes how to successfully create and execute the corporate remittance app using Hyperledger Fabric Bank-chain Network Configuration. The process flow is described in the steps below.

Step 1: Set up The Hyperledger fabric network's blockchain model utilizing the remote bank station and Bank A and B node members. Here, each bank is considered a node, and the network can be used to connect these nodes.

Step 2: After connecting each node, an intelligent contract (corporate remittance chain code) is designed in this step to permit us to apply remittance transactions and recover blockchain transaction information.

Step 3: After applying remittance transactions and retrieving blockchain transaction information, it sets up each bank's PostgreSQL database. The database would include the following:

i. Client database that would contain the information of the client
ii. The transaction database would contain the facts of all the transfers originated and collected by the bank.

Step 4: In this stage, Bank A and Bank B establish a private IPFS network of two nodes so that the nodes can safely and securely exchange remittance documents.

Step 5: In this step, setup a backend node server that communicates with the following:

i. Blockchain network
ii. PostgreSQL database
iii. IPFS network
iv. Frontend Application

It receives transaction data from the servers, submits payment requests to the blockchain network, publishes IPFS compliance records, and notifies the customer's balance when the transaction is complete. It also retrieves customer information to populate the front-end application user interface.

Step 6: This step sets up a Node.js transaction listener that listens to a bank client for incoming transactions, retrieves transaction information and adds it to the transaction database, adds the client's balance, and retrieves approval records from the IPFS network for an incoming remittance request.

Step 7: After completing a remitting request, creating a React frontend that enables clients to file requests for remittance and view transactions on their accounts is established.

1. START
2. Input: Function
3. Initialize COUNT = 0
4. Process function:
   - Increment COUNT by 1
   - Based on the function:
     - Add new user ID and save details to blockchain for Add_Roles and NewUserRegistration
     - Setup HyperLedger Fabric network and save node details for SetupHyperLedgerFabricNetwork
     - Design contracts, execute transactions, and save details to blockchain for ContractDesign
     - Setup bank's database for SetupBankDataBase
     - Setup bank's backend server and execute transactions for BankBackEndServer
5. IF COUNT = 6
   THEN Output "Transaction is Successful"
   ELSE Repeat and Validate all Steps Again
6. END

## Explanation

This algorithm is a high-level description of a process for executing various tasks related to the proposed system. It begins by accepting a function as input, representing a specific action. A counter variable, COUNT, is initialized to track the number of times the process function is executed. The process function involves incrementing COUNT and executing different actions based on the input function. For instance, it may include adding new user IDs and saving details to the blockchain, setting up a Hyperledger Fabric network, designing contracts, or configuring a bank's database and backend server. After each execution, the algorithm checks if COUNT equals 6. If so, it outputs "Transaction is Successful", indicating that all required tasks have been completed. If not, the process is repeated until the condition is met. This iterative approach ensures that tasks are executed accurately and efficiently, providing a structured framework for managing various operations within the blockchain ecosystem.

## Performance and Evaluation

In this section, we discuss the setup procedure to evaluate the performance of the proposed approach. The setup is two different banks and a single user for each bank. The execution of the actual setup and implementations are shown in Figs. 3, 4, 5, 6, 7, 8. We used applications such as Hyperledger, Docker binaries, CURL tool, Docker Compose, and Go version 1.12.x, Node.js version 10.15.3, npm version 5.6.0, Apache JMeter Tool, and Python 3.7.

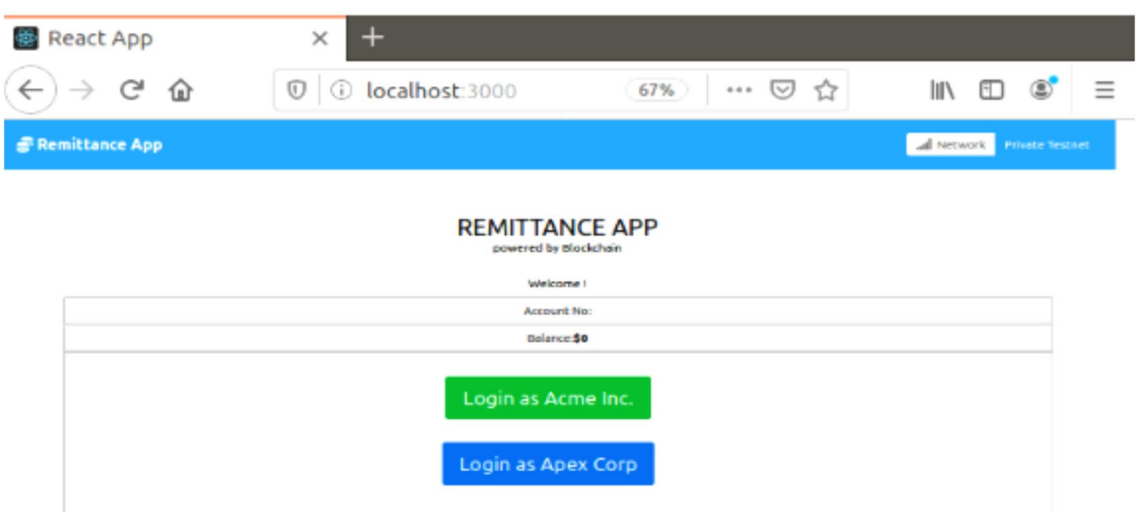


**Fig. 3** FrontPage of Remittance App

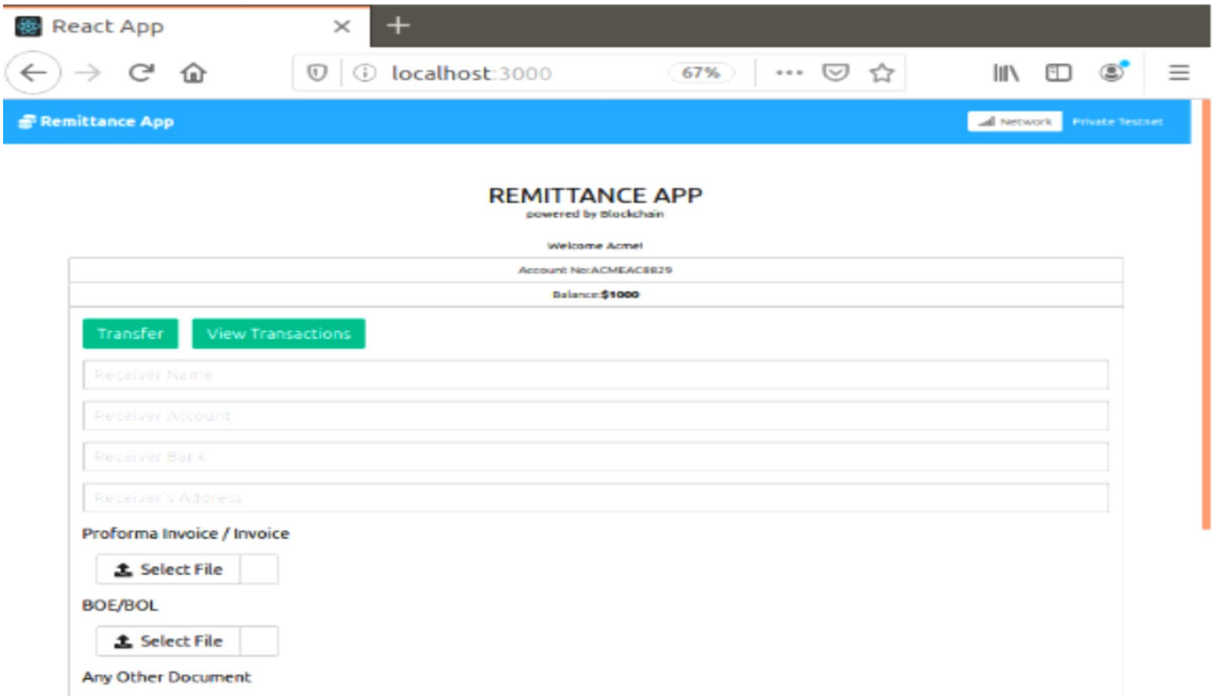


**Fig. 4** Page to transfer and View Transactions (Login to Acme User)

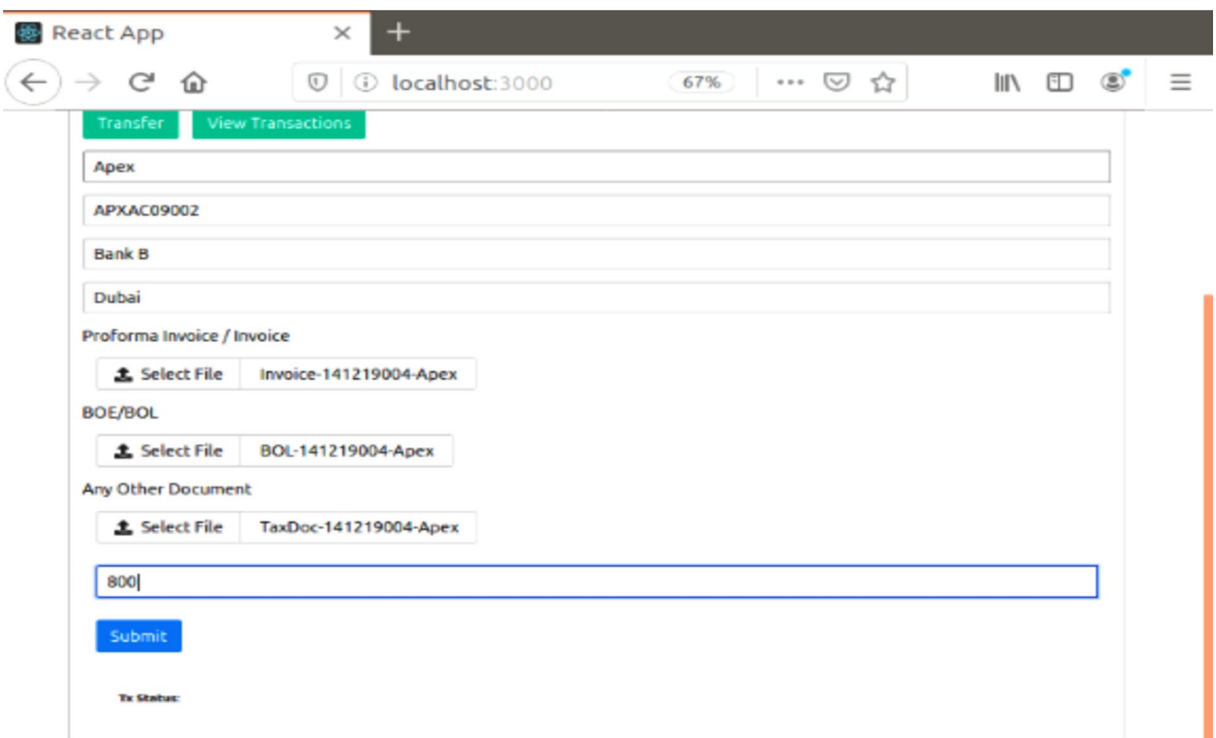


**Fig. 5** Carry out Transaction from Bank A to Bank B of $800 and upload sample documents (invoice/BOE/BOL, etc.)

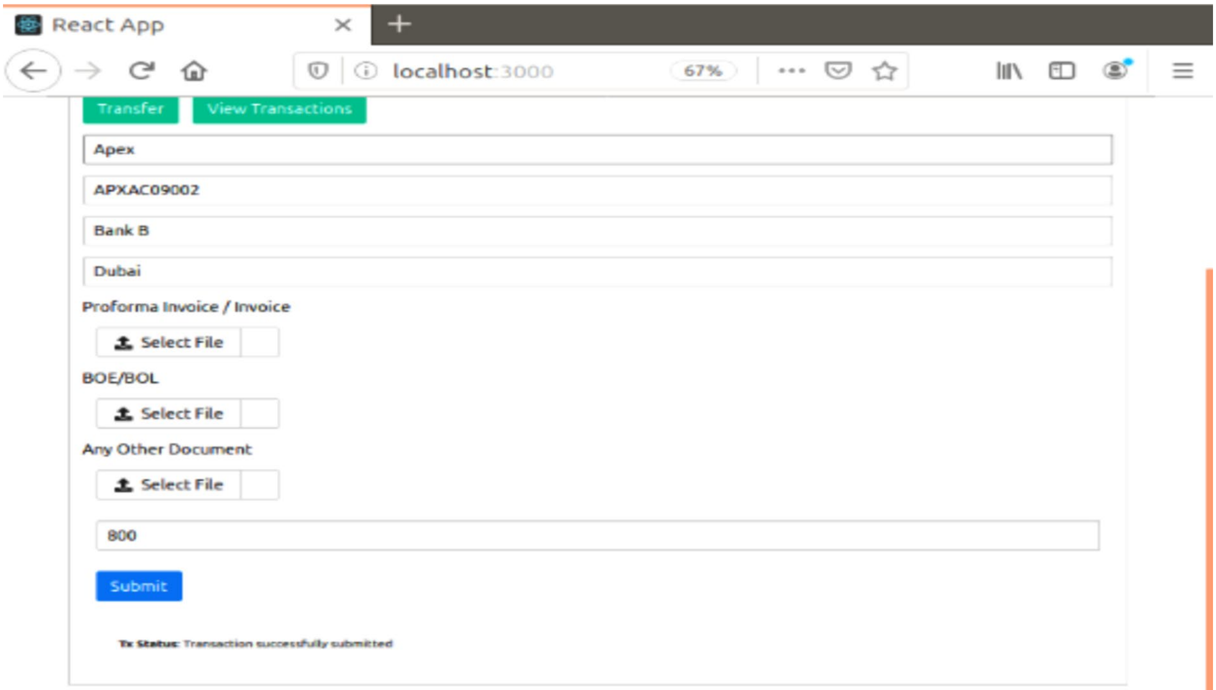


**Fig. 6** Transaction Submission Screen

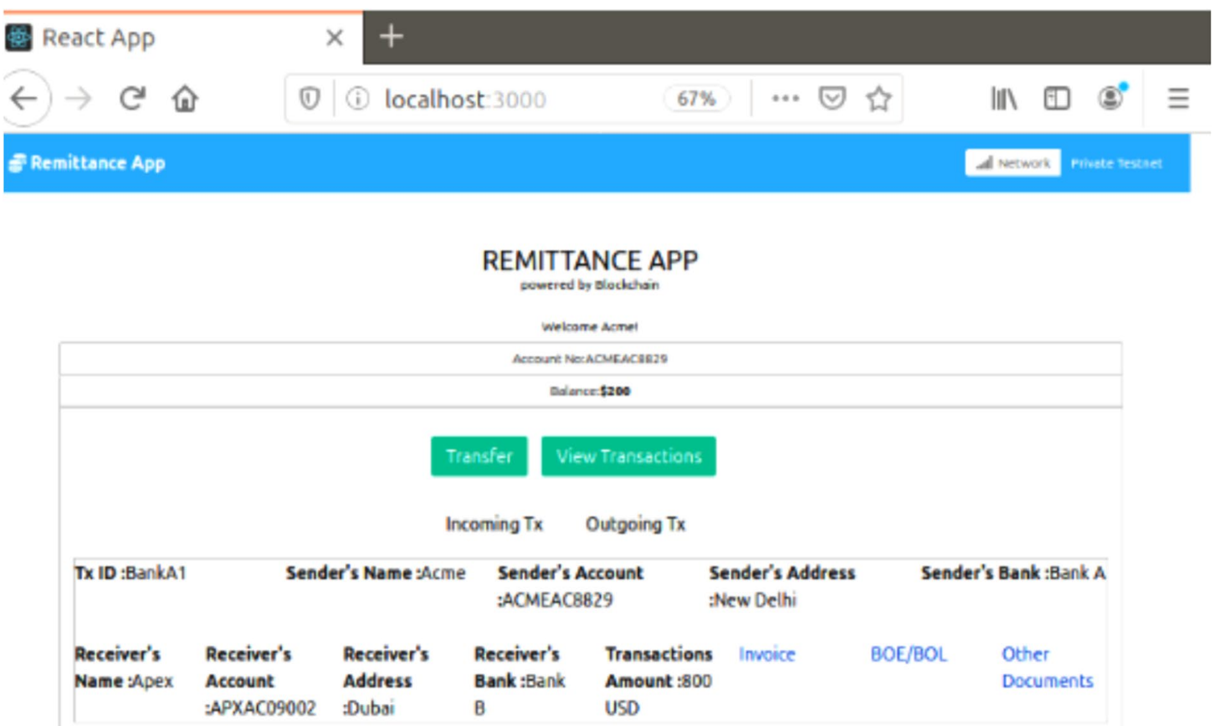


**Fig. 7** View Transactions Screen to View Transaction Status

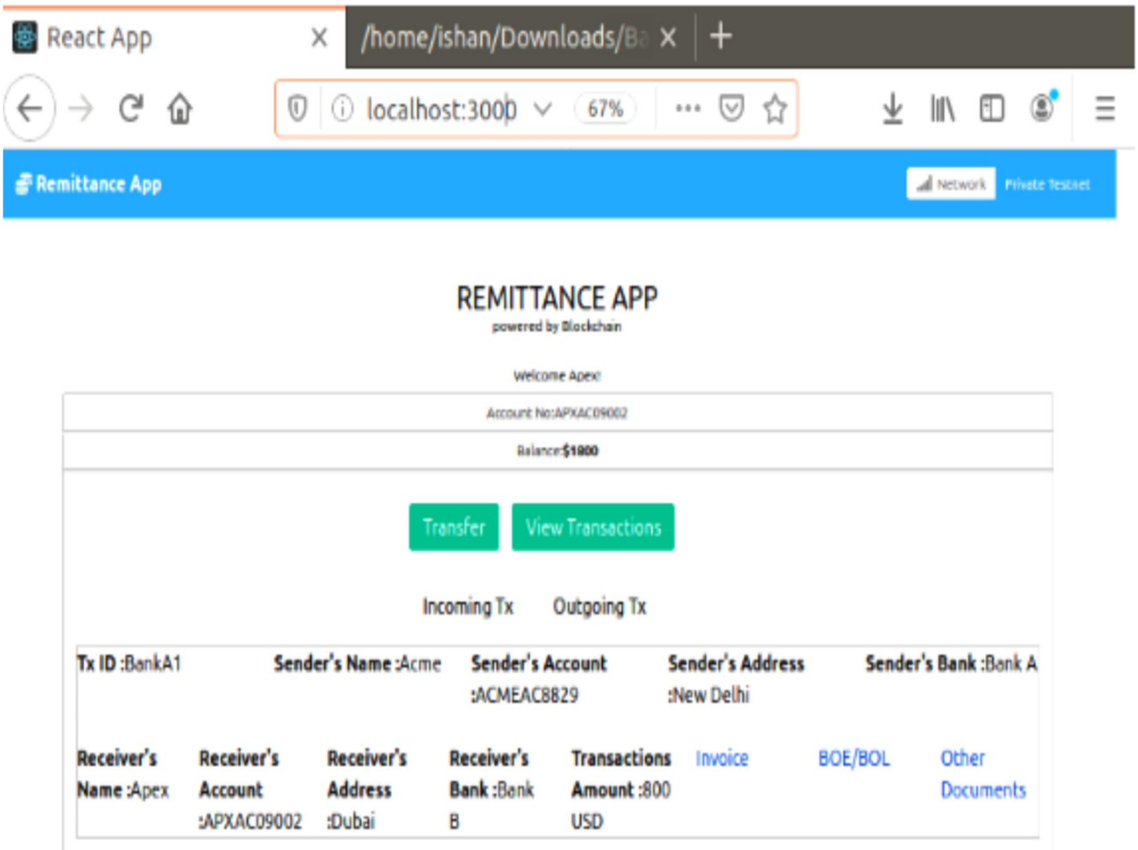


**Fig. 8** Another User Bank B Screen

Step 1. First, we have the front page of the remittance application, where we must authenticate the users/Banks.

Step2. The second step is displayed after the login page to transfer and view the transactions. We can upload the invoice and other documents as well.

Step3. The next step is to carry out the transactions from Bank A to Bank B of $800 and upload the sample documents like BOE/BOL.

Step4. In this step, transactions are submitted by clicking on the submit button.

Step5. Here, all the transaction details for the sender and receiver are displayed.

Step 6. The last step is to confirm whether the transaction was received at Bank B. It will display another User's Bank B Details.

The Apache JMeter (version 5.2.1) performance evaluation tool, a desktop performance analysis tool for testing applications in various situations, was used here to analyze the system under real conditions. Evaluation metrics include execution time, latency, throughput, and average execution time.

Execution time: The time difference between Transaction completion (TC_time) and deployment time (TD_time) in seconds, expressed as max (TC_time)—min (TD_time), Transaction Completion Time.

Latency: response time–request time

Throughput: throughput is the amount of data transferred per unit of time.

**Table 3** Average Execution Time

| Number of transactions | Average Execution time(s) |
|---|---|
| 100 | 18 |
| 200 | 40 |
| 300 | 57 |
| 400 | 100 |
| 500 | 137 |
| 600 | 159 |
| 700 | 200 |
| 800 | 247 |
| 900 | 288 |
| 1000 | 343 |
| 1100 | 400 |

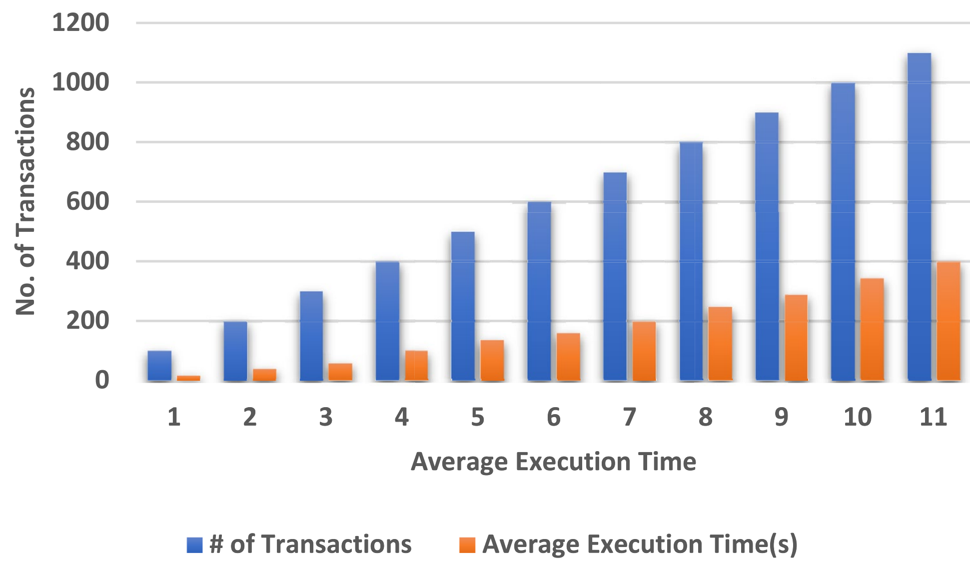


**Fig. 9** Average execution time of transactions

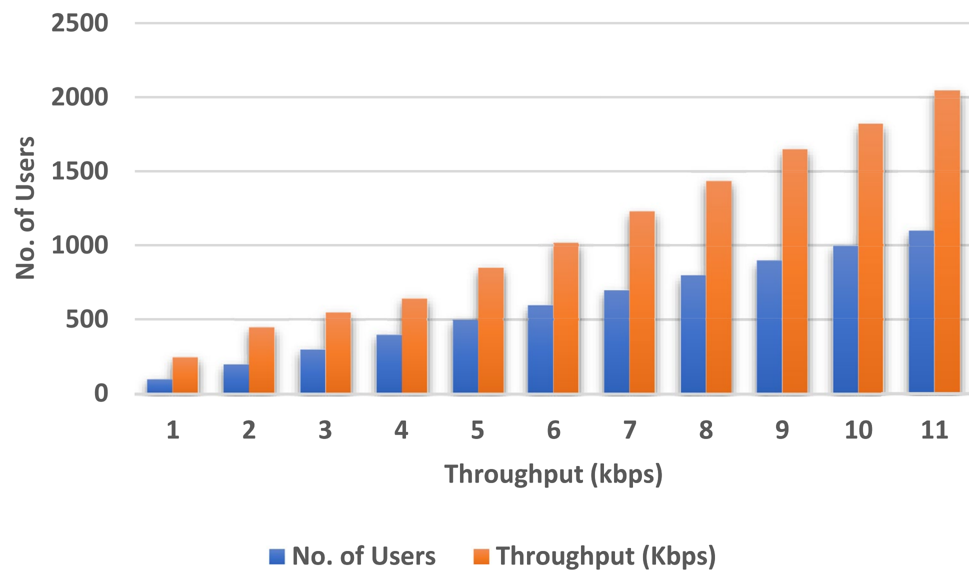


**Fig. 10** Graphical representation of throughput

**Table 4** Average Throughput

| Number of users | Throughput (Kbps) |
|---|---|
| 100 | 250 |
| 200 | 450 |
| 300 | 550 |
| 400 | 645 |
| 500 | 850 |
| 600 | 1020 |
| 700 | 1230 |
| 800 | 1435 |
| 900 | 1650 |
| 1000 | 1820 |
| 1100 | 2045 |

**Table 5** Execution time comparison (MS)

| No. of transactions | Existing method | Proposed method |
|---|---|---|
| 100 | 7.318 | 18 |
| 200 | 150.955 | 40 |
| 300 | 152.218 | 57 |
| 400 | 22.085 | 100 |
| 500 | 23.881 | 137 |
| 600 | 269.367 | 159 |

Average execution time (AET): TC_time and TD_time completion (tx2) were calculated for various transactions. As the number of transactions increases, so does the execution

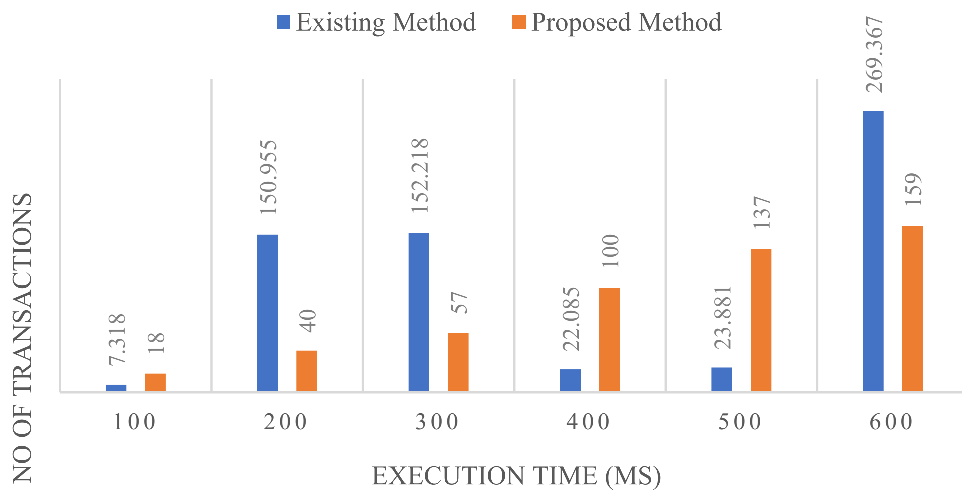


**Fig. 11** Execution time comparison

time. Transactions here refer to multiple functions used in smart contracts. Through JMeter, several transactions were submitted, and performance parameters were noted. In this case, AET was measured. Table 3 shows the average execution time of transactions represented in Fig. 9.

1) Throughput: Data transfer on an hourly basis, measured in kb/s. Figure 10 shows the system's amount. Here, we use JMeter to calculate the number of users from 100 to 500. Experiments now show that the system's throughput increases as user requests increase. Table 4 shows the average throughput.
2) Average latency:

This is the latency time between two system component's requests and responses. JMeter is used here to measure the delay. The delays measured in this experiment are incremental, with a maximum delay of 10 ms. Execution time for performing blockchain transactions between the Existing method and the proposed method has been compared, and as per the observation, the proposed method is showing improvement compared to the existing method because it has used the IPFS protocol and Hyperledger fabric to optimize the performance.

The following are the details of the execution time in milliseconds to show the comparison between the proposed and existing methods. Table 5 compares the execution time, which is graphically represented in Fig. 11.

## Conclusion

The research demonstrates the formidable potential of leveraging Hyperledger Fabric to implement corporate remittance and construct versatile investment and financial ecosystems. These systems exhibit superior organization and transparency compared to conventional banking structures. Furthermore, integrating IPFS ensures secure and reliable communication between banks, enhancing the overall trustworthiness of transactions. The JMeter tool for system simulation yielded promising results across varying transaction volumes, indicating robust performance. Future endeavors could enhance scalability, fortify security measures, ensure regulatory compliance, and refine user experience. Additionally, exploring interoperability with other blockchain networks and emerging technologies could unlock new avenues for innovation and real-world deployment. Engaging with stakeholders through community initiatives will be pivotal in fostering collaboration and driving the continued evolution of blockchain-powered banking and financial systems.

**Author Contributions** Author 1 conceived and designed the study, performed the experiments and analyzed the data. Authors 2 and 3 supervised the research, guided the study, and critically reviewed the manuscript. All authors read and approved the final manuscript.

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## Declarations

**Conflict of Interest** The authors declare no conflict of interest.

**Clinical Trial** No clinical trials were conducted as part of this study.

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