Blockchain Based Credibility and Traceability For Crowdsourcing Services

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ABSTRACT

Crowdsourcing relies on trust and reliability within its diverse community, often including freelancers from platforms like Upwork and Freelancer. However, addressing malicious actors and ensuring legal accountability poses challenges. Blockchain technology, with its immutability, decentralization, and traceability, offers a solution, but the choice of consensus algorithm is critical. In this study, Corda Blockchain is leveraged, seamlessly integrated with a crowdsourcing platform. Tasks are managed through Flows Development, and the consensus protocol rigorously validates transactions, swiftly identifying and rejecting malicious nodes. Corda's built-in reputation system enhances ecosystem credibility, while Notary nodes prevent double spending, ensuring transaction validity and non-duplication. The proposed system provides credibility, data integrity, selective node acceptance, and genuine traceability in crowdsourcing. Impressive performance metrics are demonstrated by Corda, with an exceptionally low latency of approximately 0.006988 seconds, signifying rapid transaction processing with minimal delay. Additionally, remarkable throughput is exhibited, with approximately 98.77 transactions per second handled.

Keywords: Crowdsourcing, Malicious, Consensus, Distributed Ledger, Decentralization.

INTRODUCTION

BLOCKCHAIN:

Blockchain is a decentralized and digitally secured ledger technology that records transactions in a transparent and immutable manner. It consists of a chain of blocks, each containing validated transactions,and is characterized by cryptographic links between these blocks to [1] [2] ensure data integrity and security.

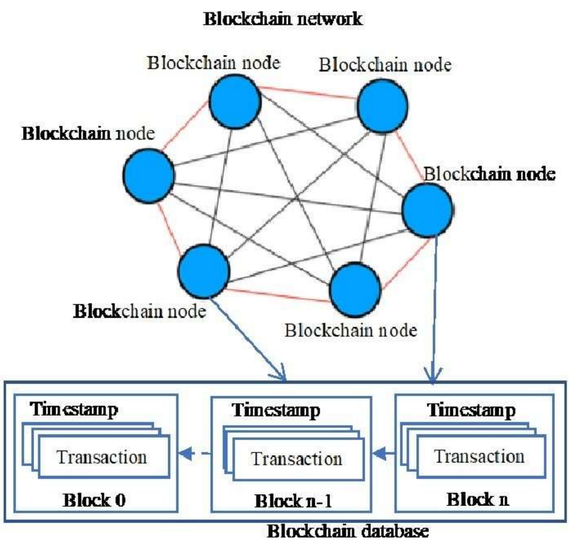

Fig 1. Blockchain Architecture

1.1 *Crowdsourcing Services*

Crowdsourcing services refer to online platforms or services that allow organizations or individuals to outsource specific tasks or projects to a large group of individuals, typically over the internet [1][4]. These individuals, known as "crowd workers," are compensated on a per-task or per-project basis and can be located anywhere in the world. These services can be used for a wide range of tasks, including data entry, content creation,image labeling, and research and development. Crowdsourcing platforms allow businesses and individuals to access a diverse pool of talent and expertise,often at a lower cost than hiring full-time employees or specialized contractors.

1.2 *Blockchain in Crowdsourcing*

Blockchain technology has revolutionized crowdsourcing by providing a highly secure and transparent ledger for recording contributions, tasks, and rewards.[1][4][7][8] This transparency reduces the risk of fraud and disputes, as all participants can verify transactions. The decentralized nature of blockchain enhances security and trust, as thereis no central authority. Additionally, smart contracts automate processes, ensuring fair compensation and efficient task completion. Overall, blockchain integration in crowdsourcing creates a trustworthy ecosystem, benefiting both platform operators and participants.

1.3 Components of Blockchain

Blockchain Nodes: These authorized participants are the backbone of a blockchain network, responsible for maintaining the ledger's integrity and facilitating seamless communication among network members.

Transactions: Transactions in blockchain are the fundamental actions where assets or data change hands between multiple parties, serving as the building blocks of the ledger and ensuring trust and transparency in digital interactions.

Blocks: Blocks are consecutive records within the blockchain, containing transaction data, timestamps, and cryptographic links. They create an unbroken chain of information, guaranteeing data security, transparency, and immutability.

Miners: Specialized nodes in a blockchain network, miners validate and secure transactions by solving complex cryptographic puzzles. Their efforts are crucial for maintaining the network's consensus and ensuring the security of the blockchain.

Consensus: Consensus mechanisms are the rules and protocols that govern how transactions are verified and added to the blockchain. They play a pivotal role in maintaining the legitimacy and trustworthiness of the ledger among network nodes.

Ledger: The blockchain ledger is a decentralized system designed to securely record and store transaction data, providing transparency and trust by eliminating the need for centralized intermediaries.

Decentralized Ledger: A decentralized ledger, such as in blockchain, is a distributed database that records transactions in a secure and transparent manner, reducing reliance on centralized authorities and enhancing data integrity.

Distributed Ledger Technology (DLT): DLT refers to a decentralized database collectively maintained by multiple participants. In blockchain, cryptographic hashes are utilized to ensure the permanence and security of recorded data, fostering trust and accountability in various applications.

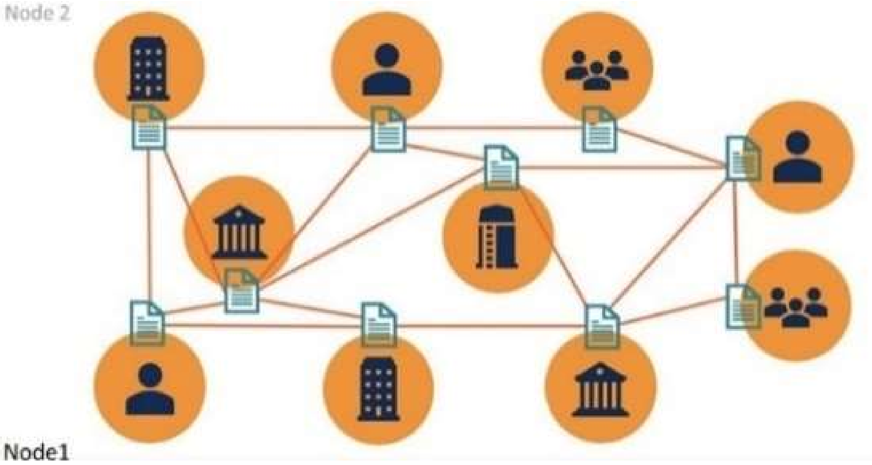

Fig 2. Distributed Ledger Technology

1.5 Types of Blockchain

Public Blockchain: Open to everyone, examples are Bitcoin and Ethereum, allowing anyone to join and validate transactions on the [9] decentralized network.

Private Blockchain: Used by a single organization ortrusted group, not open to the public, typically for internal record-keeping or specific business purposes.

Consortium Blockchain: Governed by a group of trusted organizations, it's a hybrid of public and private blockchains often used for collaborative efforts, such as supply chain management or healthcare records.

1.6 Advantages of Blockchain

Immutability: In a blockchain, data once recorded cannot be erased or altered, creating a secure and unchangeable historical record. This immutability is achieved through cryptographic hashing, ensuring the integrity of information and preventing tampering or fraud.

Transparency: Blockchain's decentralized nature allows any member of the network to verify and access the entire ledger, promoting transparency. This transparency fosters trust among participants, as transactions and data are open for scrutiny, reducing the need for intermediaries.

Security: Blockchain employs rigorous validation mechanisms for its nodes, ensuring that only authorized participants can join the network. This enhances the overall security of the blockchain, reducing the risk of unauthorized access and malicious activities.

Traceability: The blockchain ledger creates an irreversible audit trail using cryptographic hash mechanisms for each transaction. This audit trail enables easy tracing of transaction history, making it invaluable for tracking and verifying the origin and legitimacy of assets or data.

Node Identity: Blockchain's hash mechanisms maintain identity records for every participating node. This feature aids in tracing node activities and transactions, providing accountability and transparency within the network. It helps in ensuring that only trusted entities participate in the blockchain ecosystem.

1.7 Disadvantages of Blockchain

Speed and Performance: Blockchain's reliance on various operations and the recording of every change can lead to slower processing compared to [8][12] traditional databases.
High Implementation Cost: Integrating blockchain iscostlier than traditional databases and requires meticulous planning, posing challenges for businesses.

1.8 Applications of Blockchain Technology

Healthcare: Blockchain technology securely stores patient medical records in a tamper-proof and transparent manner, ensuring data integrity, accessibility, and patient privacy within the healthcare industry.

Transfer Contracts and Wills: Smart contracts on blockchain automate and secure asset transfer and inheritance processes, reducing the need for intermediaries and ensuring the execution of contractual agreements according to predefined rules.

Supply Chain Management: Blockchain is used to track and authenticate products throughout the supply chain, providing real-time visibility, traceability, and preventing counterfeiting, which is especially valuable for industries like food, pharmaceuticals, and logistics.

Copyright and Royalties Protection: Blockchain safeguards intellectual property rights by providing a transparent and immutable ledger for copyright ownership and distribution of royalties, ensuring fair compensation to creators and artists.

Voting: Blockchain enhances election security by creating immutable and verifiable records of votes, reducing the risk of fraud and ensuring the integrity of the democratic process.

Cryptocurrency: Blockchain is the underlying technology for cryptocurrencies like Bitcoin and Ethereum, enabling secure and transparent peer-to-peer transactions without the need for intermediaries, such as banks.

Internet of Things (IoT): Blockchain secures and manages data generated by interconnected IoT devices, ensuring data privacy, authentication, and integrity, particularly important in smart cities, agriculture, and industrial applications.

Asset Administration: Blockchain simplifies asset tracking and management by providing a transparent and auditable ledger, reducing errors and fraud in asset administration.

Crowdsourcing Services: Blockchain facilitates decentralized crowdfunding by transparently tracking contributions and ensuring that funds are used as intended, promoting trust among contributors and project creators.

In previous works, decentralized blockchain technology was employed to enhance traceability and credibility, which are vital for mitigating data tampering issues and achieving immutability and transparency.

However, these efforts faced limitations, including the risk of false reputation scores from malicious nodes and a tendency toward centralization with consensus algorithms like PoS, PoW, and DPoS, potentially compromising data integrity in public blockchain networks.

Consensus algorithms played a pivotal role in upholding the integrity and security of these decentralized networks. Proof of Work (PoW),[7][13] as exemplified in Bitcoin, involvedminers competing to solve intricate mathematicalproblems to validate transactions. Proof of Stake (PoS), utilized in networks like Ethereum, selected validators based on their cryptocurrency holdings rather than computational power. Another approach, Proof of Trust (PoT), determined validators based on their contributions to the network rather than their machinery or stake. Delegated Proof of Stake (DPoS), as employed innetworks like EOS, allowed token holders to vote for delegates responsible for transaction validation.

In summary, in previous works, decentralized blockchain technology was leveraged to bolster traceability and credibility. However, these endeavors encountered challenges such as false reputation scores and the potentialfor centralization. Diverse consensus algorithms,including PoW, PoS, PoT, and DPoS, were utilized to maintain network integrity and security, each offering a unique approach to transaction validation.

1.10 BLOCKCHAIN PLATFORMS

Ethereum:
Ethereum is a decentralized, open-source blockchain platform that allows developers to build and deploy smart contracts and

decentralized applications[2][4] (DApps). It's known for its cryptocurrency, Ether (ETH), and its ability to execute code on its blockchain. Ethereum's primaryfocus is on providing a global, permissionless, and public blockchain for a wide range of use cases, from decentralized finance (DeFi) to token creation.

Hyperledger Fabric:
Hyperledger Fabric is a permissioned blockchainframework under the Hyperledger project, hosted by the Linux Foundation. It's designed for enterprise applicationsand enables organizations to [8] build private or consortium blockchains. Hyperledger Fabric offers a high degree of flexibility, scalability, and modular architecture, making itsuitable for businesses looking to create customized, secure, and efficient blockchain networks with privacycontrols.

Corda:
Corda is another permissioned blockchain framework designed for business applications, particularly in the financial sector. It was developed by R3 and is known for its focus on privacy, scalability,[26] and interoperability. Corda enables different parties to transact directly with each other while keeping the details of their transactions confidential. It's well-suited for complex[14][18] financial transactions and other use cases where privacy and legal compliance are critical.

1.11 Key Features of Corda

- Privacy
- Security
- Scalability
- Enterprise focus

In this paper, the challenges posed by open transaction sharing and potential node participation in multiple transactions are effectively addressed through the seamless integration of the Corda blockchain framework. This strategic incorporation offers several key advantages: Firstly, enhanced credibility is achieved as Corda's design ensures trustworthiness and authenticity in all transactions. Secondly, traceability is improved, facilitating easier tracking and verification of transactions within the ledger. Thirdly, the adoption of Corda results in a reduction of the typically high computational costs associated with traditional blockchain networks, rendering the system more efficient and cost-effective. Perhaps most importantly, Corda's privacy-centric approach ensures the confidentiality and security of sensitive transaction data, effectively addressing concerns about privacy and ensuring that information remains accessible solely to authorized parties.
The paper is organized as follows: In Section II, an overview of previous research in the fields of Blockchain and Crowdsourcing is provided. Section III details the methodology and implementation of the proposed work. Section IV is dedicated to the presentation and analysis of the results obtained. Section V covers the conclusion and outlines future avenues of exploration. The paper concludes with a list of references for further reading.

RELATED WORKS

Liang Tan; Huan Xiao et.al [10] introduced a new way to make crowdsourcing systems more secure. Traditionalcrowdsourcing relies on centralized trust, which can be risky if there are attacks or dishonest behavior. To tackle this, the authors suggest using blockchain technology to create a decentralized and trustworthy system. They break the crowdsourcing process into nine stages, each managed by a smart contract on the blockchain. These smart contracts handle tasks and transactions, including payments, in a secure and transparent manner, removing the need for middlemen. This approach improves security in crowdsourcing by eliminating the vulnerabilities associated with centralized platforms.

Xiaolong Xu .et al [11] presents a method called BPCM, which uses blockchain technology to make mobile crowdsourcingmore private and efficient. In typical crowdsourcing situations, there's a risk of information leaks during communication, and service providers may not choose tasks effectively. To solve these issues, BPCM first createsa secure mobile crowdsourcing framework with blockchain. This protects participant privacy and ensures that service requests and provision are reliable. To make things even better, the authors use two techniques: DBSCAN for grouping requestors and IDP for coming up with the best service strategies. So, in a nutshell, this paperoffers a way to make mobile crowdsourcing safer and moreeffective with blockchain.

Dimitrios G. Kogias .et al [12] presented how Crowdsourcing has gained significant attention across various sectors for its ability to harness the collective power of a crowd to achieve diverse objectives such as information gathering, fundraising, and task execution. However, ensuring data integrity and preventing repudiation pose significant challenges in existing crowdsourcing systems. Blockchain technology has emerged as a promising solution to addressthese concerns. This paper examines the advantages of incorporating blockchain technology into crowdsourcing systems. By presenting real-life examples of crowdsourcing use cases, we explore how blockchain can enhance data integrity and establish nonrepudiation. Specifically, we highlight blockchain's potential as a reliable and secure database in the context of crowdsourcing.

J. Zou, B. Ye, L. Qu et.al [13] discusses a new way to make online services more trustworthy by introducing an accountabilitysystem. To achieve this, they use blockchain technology, which offers a reliable and unchangeable record of evidence. The challenge, however, is finding the right consensus protocol for crowdsourcing services. In this paper, they propose a Proof-of-Trust algorithm that selectsvalidators based on the participants in the service. It uses RAFT leader election and Shamir's secret sharing methods, solving scalability issues and avoiding low throughput,which can be problems in other algorithms. Importantly, this approach can address untrustworthy behaviour that traditional methods struggle with. In summary, this paper demonstrates how their approach can enhanceaccountability in the online service industry, making it more reliable.

J. Kang, Z. Xiong et.al [14] discusses how to make consortium blockchains more efficient and incentivize miners to verify transactions. In a consortium blockchain, multiple organizations manage it together. In these blockchains,miners with more stakes are more likely to solve puzzles and earn transaction fees from users. The authors propose agame-theoretic model to balance network speed and transaction fees using a Stackelberg game. The goal is to maximize both the user's benefit and the miners' profit. Thepaper shows that this model works well in encouraging miners to verify transactions effectively.

Y. He, H. Li et.al [15] presents a way to encourage cooperation indistributed peer-to-peer (P2P) applications usingblockchain technology. In P2P apps, users work together for tasks like sharing files or sending messages. The authors suggest using a cryptocurrency like Bitcoin to reward users who successfully help with these tasks. Sincesome users and miners in this blockchain P2P systemmight act selfishly or collude, the paper uses game theory to analyze and test their incentive system, showing that it's effective and secure.

K. Lei, Q. Zhang et.al [16] deals with PBFT (Practical Byzantine faultTolerance) is a widely used algorithm, but it has difficulty in identifying and removing faulty nodes in time and vulnerability to attacks against the primary node. Additionally, the equality of discourse rights among consortium members may not be applicable in certain scenarios. To address these issues, the paper proposes RBFT as an improved consensus algorithm for consortiumblockchain systems, addressing some of the weaknesses ofPBFT by incorporating a reputation model to evaluatenode behavior and introducing a reputation-based primarychange scheme.

Yuan Lu; Qiang Tang et.al [17] explores how blockchain technology, specifically smart contracts, can be used in decentralized sharing economies. It points out that running complex and randomized machine learning programs on open blockchains is challenging due to their limitations. To overcome this, the paper suggests a crowdsourcing approach based on game theory. This approach uses a simple incentive system to collectively execute a wide range of complex programs on the blockchain while preventing false results. Importantly, it works without the need for a trusted third party and can handle non-colluding service providers and most coalitions, except for one less than the total number of service providers. existing technologies.

Corda's Unique Consensus Approach:

Corda's consensus mechanism distinguishes itself from traditional blockchain networks by prioritizing privacy andscalability. Instead of globally broadcasting transactions, it focuses on involved parties, promoting efficient consensus among relevant participants.[24][26] This unique approach makes Corda ideal for enterprise-level blockchain applications.

Key Participants - Notaries and Transaction Parties:

Corda's consensus mechanism involves two primary participant types: notaries and transaction parties. Notaries are specialized nodes responsible for ensuring transaction validity and preventing fraud, such as double-spending. Transaction parties initiate and validate transactions, and the consensus among them [25] determines a transaction's success and updates to the ledger.

Efficient Coordination for Privacy and Security:

Corda efficiently coordinates notaries and transaction parties, striking a balance between privacy, scalability, and security. This approach ensures that only relevant parties are involved in the consensus process while maintaining the integrity and consistency of the blockchain ledger.

Validate Consensus - Ensuring Transaction Validity:

Validate Consensus is a critical part of Corda's consensus model, focusing on agreement among network participants regarding transaction validity and consistency. Corda achieves privacy by sharing transactions only with relevant parties. [24] Each participant independently validates transactions by checking them against predefined contract code and rules set by smart contracts, ensuring that only valid transactions are added to the ledger.

Notary Consensus - Preventing Double Spending:

Notary Consensus addresses the common issue of double spending in digital currencies and distributed ledgers. Corda employs trusted third-party notaries to validate and timestamp transactions. These notaries check whether a transaction's inputs have been used in other valid transactions, preventing double-spending [25]. The notary adds a timestamp to the transaction, ensuring uniqueness and allowing it to be added to the ledger.

Benefits of Combining Validate and Notary Consensus:

The combination of Validate Consensus and Notary Consensus in Corda offers several advantages. It allows for a more granular approach to consensus, accommodating different validation requirements among participants. Notaries enhance security and trust in the network, making Corda suitable for high-assurance applications like financial services and supply chain management. Additionally, Corda's privacy-focused design, combined with these consensus mechanisms, keeps sensitive business data confidential, making it a viable choice for industries that prioritize privacy and data compliance.

In summary, Corda's consensus mechanism, which combines Validate and Notary Consensus, provides a tailored, robust solution for the specific needs of businesses and industries. These mechanisms ensure data integrity, prevent double-spending, and maintain privacy, making Corda a compelling choice for a wide range of enterprise applications.

METHODOLOGY

The Architecture, Implementation and algorithm used in this study is shown here.

3.1 Architecture:

The architecture shows that in Corda's blockchain framework, the underlying logic and mechanisms facilitatea seamless process from network creation to transaction validation. The network map maintains an updated list of all participating nodes, ensuring efficient discovery and communication. Validation involves verifying transactionsagainst predefined contract code, employing techniqueslike the [26] Unspent Transaction Output (UTXO) model. Digital signatures, specifically the Elliptic Curve Digital Signature Algorithm (ECDSA), are utilized for contract signing, ensuring the transaction's integrity and authenticity. Notary services play a critical role incollecting signatures and validating transaction uniqueness,enhancing security and trust within the Corda network. This orchestrated approach encompasses data integrity,smart contract validation, cryptographic signing, and consensus-building, making Corda an ideal choice for various enterprise blockchain applications.

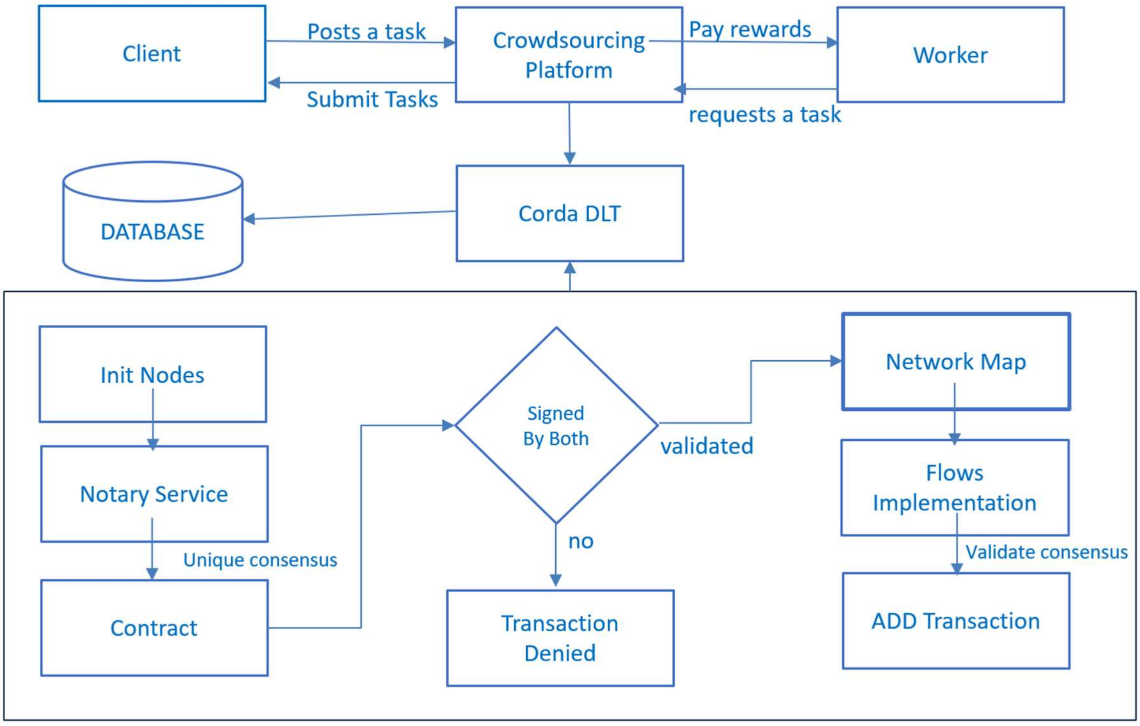

Fig. 3. Architecture Diagram of Methodology

Creation (Init Nodes):
In the first step, we set up the Corda environment byinstalling essential software tools like Gradle, Java v8,cURL, IntelliJ IDE, and Git. Once these tools are ready, we download a Corda project from the Corda GitHub repository and clone it into our workspace using Git. This initial process marks the beginning of the Corda network setup, where we prepare the foundation for all subsequent actions like network creation and building as shown in the below Fig.4.

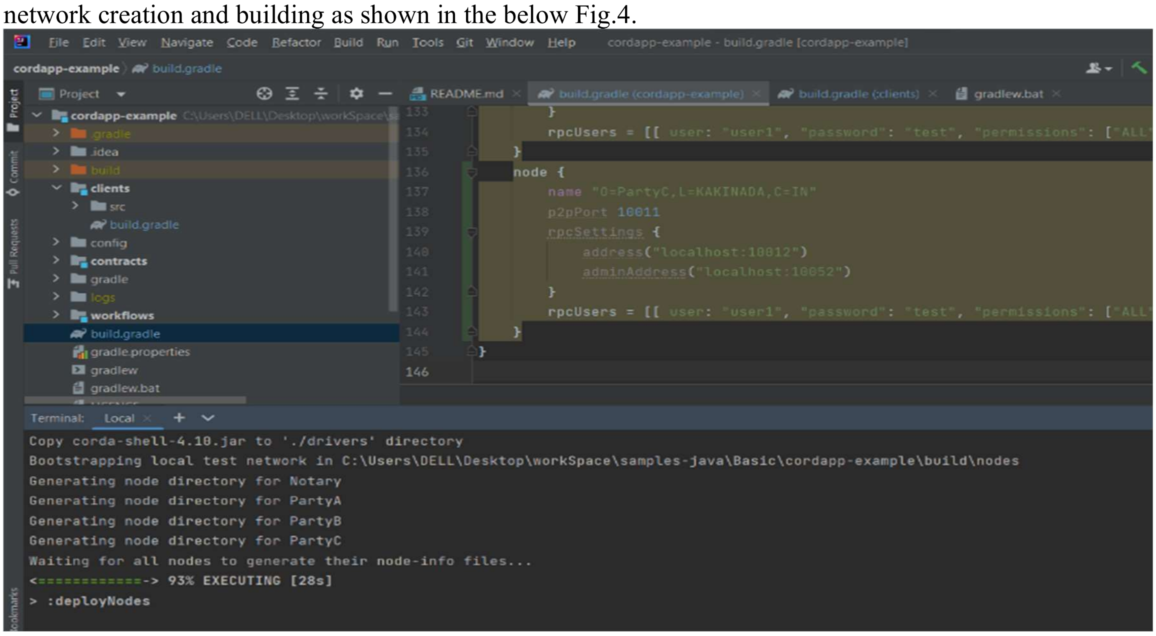

Fig.4 Building a Network with Nodes

Uniqueness Consensus (Network Service):
Once the network is created, the uniqueness consensus is established. This step involves checking the states within the network to ensure that unconsumed nodes reflect uniqueness. It's like making sure that each transaction is unique and doesn't contradict[24][25] previous ones. This consensus ensures that every participant on the network follows the same rules, promoting trust and consistency in the system. It's a fundamental part of maintaining the integrity of the ledger.

Contract and Validation:
With the network now operational, we shift our focus to contracts and validation. Smart contracts are rules thatgovern transactions on the Corda network. They are checked to ensure that transactions are valid and follow the predefined rules. Additionally, we validate

the specified values, like the iouValue, to make sure theymeet the contract's requirements. This validation step ensures that only valid transactions proceed, adding a layer of security to the network.

Network Map:

Network mapping becomes important to enable participants to discover each other within the network.Think of it as creating a map that shows where all the nodes are located. This step ensures that all nodes are aware of each other's existence,[25][26] which is crucial for conducting transactions and interactions on the network. It's like knowing the addresses of all your neighbors in a community.

Flows Implementation:

With the network and contracts in place, it's time to automate actions using flows. Flows are like automated processes that generate transactions, verify contracts, gather necessary signatures, and record transactions.Participants can view and initiate these flows to perform various actions on the Corda network, making transactionssmoother and more efficient.

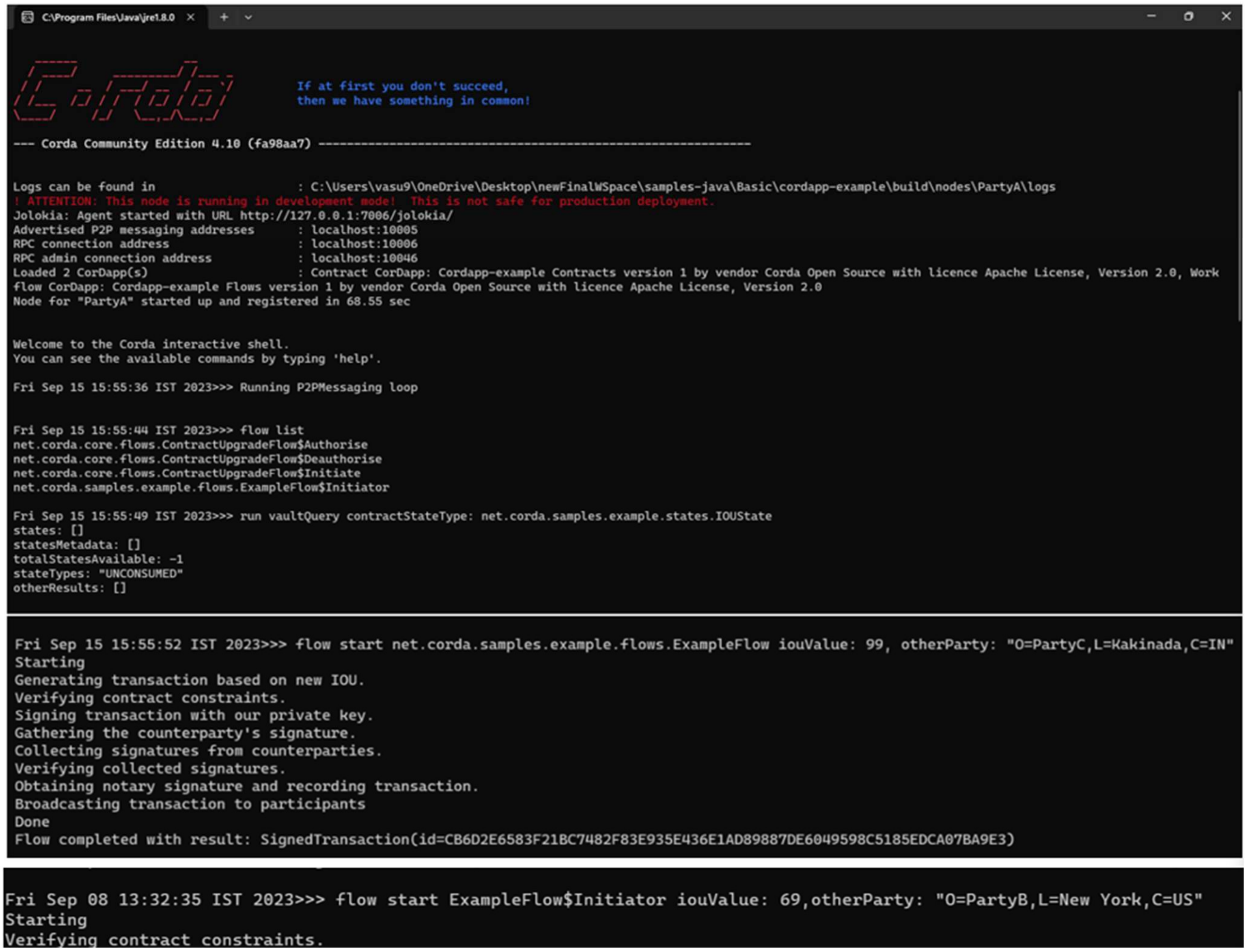

Fig.5 Implementation of Flows

Transaction Recording in Ledger:

Following the execution of flows and the successful validation of transactions, the Corda Distributed Ledger Technology (DLT) records these transactions in its ledger.This process updates the ledger with the latest transaction details, ensuring a secure and [26] immutable history of all network activities. It's akin to maintaining an unalterable digital ledger that documents each transaction, providing atransparent and tamper-proof record of the network's history. Transaction I stored securely to DLT as shown in below Fig.6.

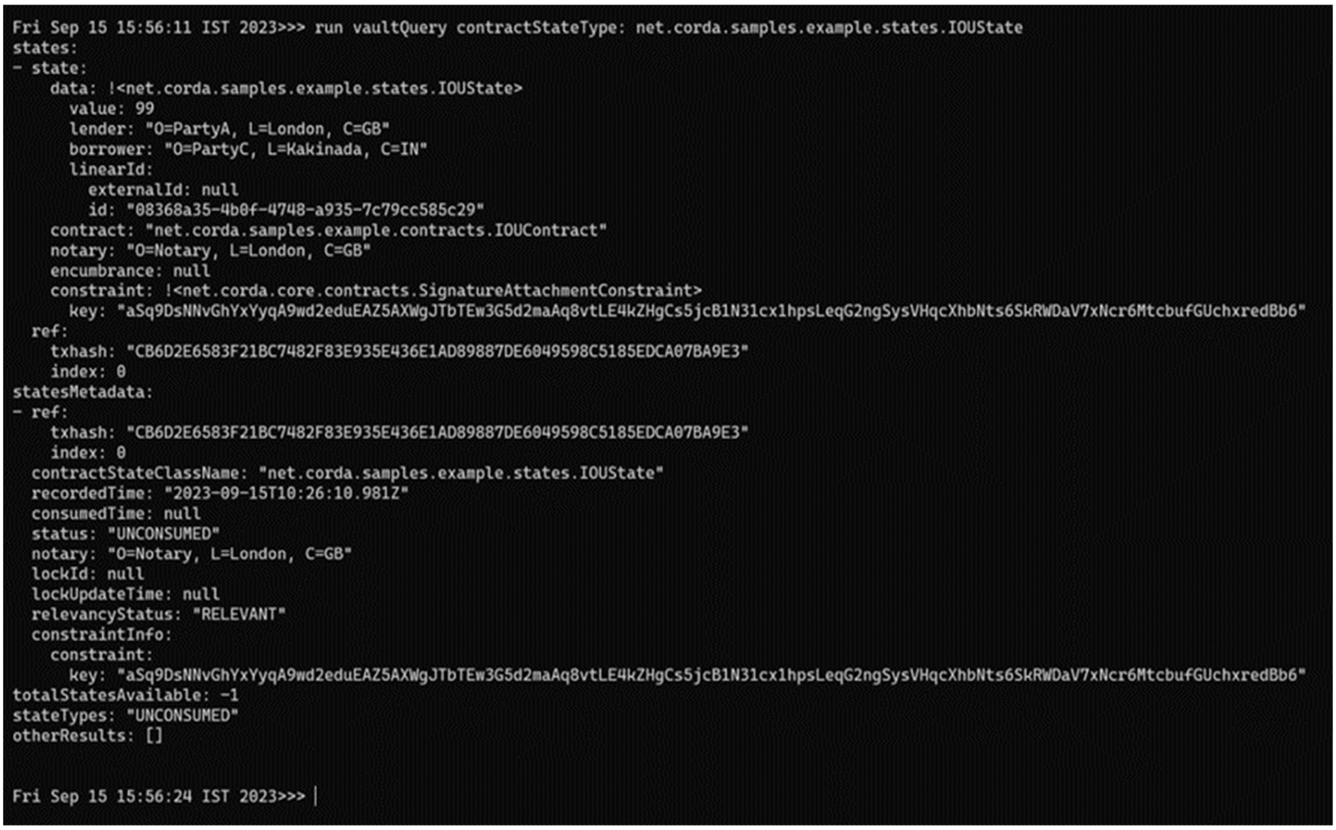

Fig.6 Details of Transaction

After a successful Transaction, details of Transaction can be checked in iouState using command line interface CLI as shown in Fig.6 or in browser that shows nodes participating in Transaction , Transaction ID with Timestamp details , which are stored without any centralized node which results immutability.

System Performance Test:

To evaluate how well the Corda network operates, weconduct performance tests. These tests measure important factors like how quickly transactions are processed(latency) and how many transactions can be handled at once (throughput). It's similar to checking how fast and efficiently a computer or a car performs under different conditions.

Performance Metrics Comparison:

Finally, we compare the performance of the Corda network with other blockchain platforms like Ethereum and Hyperledger Fabric. We use tables and graphs to show how Corda stacks up in terms of its speed, efficiency, and scalability. This comparison helps us understand where Corda excels and where it may have advantages over other blockchain systems, making it easier to choose the right tool for specific tasks.

RESULTS AND DISCUSSION

The setup and Corda functionality in this research lay a robust foundation for blockchain development. The projectcommenced with meticulous environment setup, includingthe installation of essential tools like Gradle, Java v8,cURL, IntelliJ IDE, and Git. The Corda project, sourced from the GitHub repository, was cloned and successfully built within IntelliJ IDE, ensuring a seamless setup. Subsequently, various facets of Corda's functionality were explored, encompassing the deployment of nodes, server operations, identity verification, state validation, and peer interactions. The initiation of flows and the creation of IOU states illustrated Corda's prowess in automating complex transactions while adhering to contract constraints.

In terms of results, when assessed in real-world scenarios, Corda demonstrated impressive performance metrics. It exhibited a remarkably low latency of approximately 0.006988 seconds, signifying rapid transaction processing with minimal delay. Furthermore, Corda displayed remarkable throughput, handling approximately 98.77 transactions per second, highlighting its efficiency in managing a substantial transaction volumein real-time use cases.

Table 1: Performance Results

Platform	**Latency (seconds)**	**Throughput (transactions per second)**
Corda (Real-Time)	0.006988	98.77
Ethereum	15-30	15-45 (varies with network activity)
Hyperledger Fabric	1-3	Hundreds to thousands (varies by configuration)

Table.1 provides real-time performance results for various blockchain platforms. Corda exhibits impressive latency, with only 0.006988 seconds, and a high throughput of 98.77 transactions per second. In contrast, Ethereum's latency ranges from 15 to 30 seconds, and its throughput varies from 15 to 45 transactions per second depending on network activity. Hyperledger Fabric demonstrates latency between 1 to 3 seconds and achieves hundreds to thousands of transactions per second, depending on its configuration.

Table 2: Metrics Comparison for Corda with other Blockchain Platforms

Characteristic	**Corda**	**Hyperledger Fabric**	**Ethereum**
Computation	8	7	6
Latency	8	7	6
Network Size Scalability	6	8	7
Throughput	7	8	7
Transaction Speed	8	7	6
Security	9	8	7

Table.2 shows a comprehensive metric comparison of Corda against other blockchain platforms, including Hyperledger Fabric and Ethereum. Corda scores well in computation, latency, throughput, transaction speed, and security, earning high ratings of 8 or 9. Hyperledger Fabric excels in network size scalability with a rating of 8, while Ethereum lags slightly behind in most categories, with ratings of 6 and 7. These tables collectively showcase Corda's strong real-time performance and its competitive advantage over other blockchain platforms in key metrics.

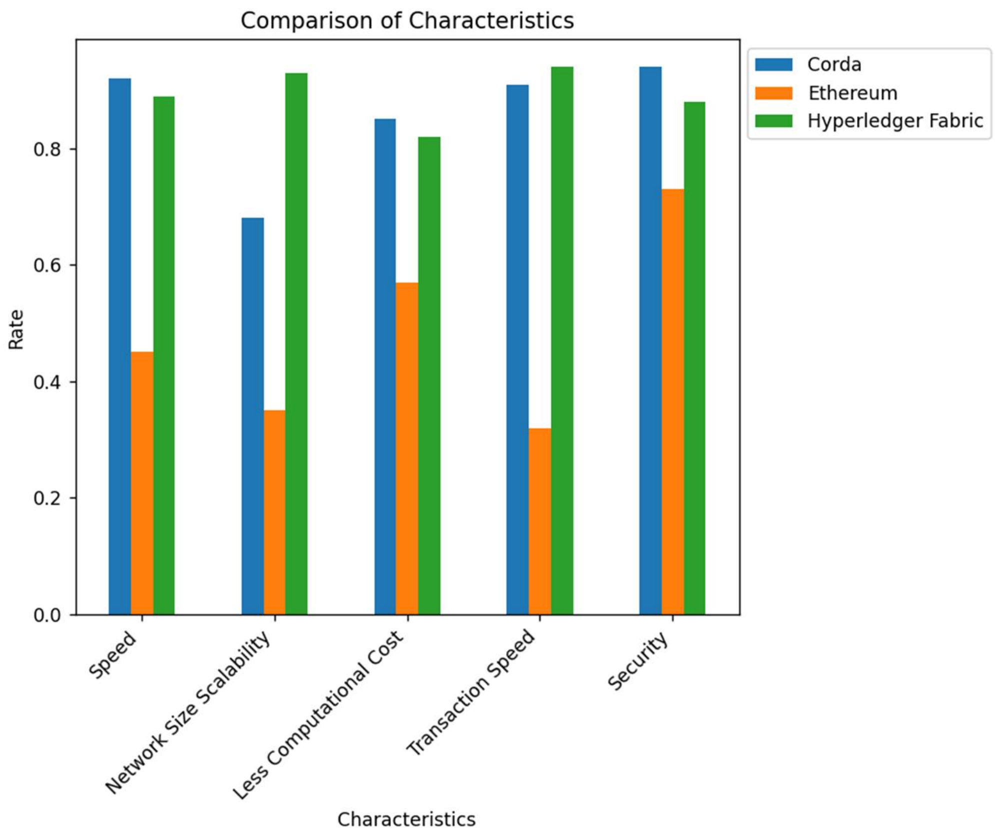

Fig 7. Bar Graph

The Fig.7 Bar graph illustrates the performance of the Corda Blockchain framework in comparison to other blockchain platforms across various crucial characteristics, including speed, network size scalability, computation cost, transaction speed, and security. Notably, Corda outperforms its counterparts in all aspects except network-size scalability, where Hyperledger Fabric shines, owing to its ability to handle larger networks efficiently. This distinction is evident from the graph's data.

Additionally, In Fig.8, the Line chart, reinforces these findings, showing that both Hyperledger Fabric and Corda consistently exhibit the best performance metrics. These observations suggest that, particularly for crowdsourcing services, Corda and Hyperledger Fabric are ideal choices due to their exceptional credibility and traceability, as indicated by their superior performance across these critical dimensions.

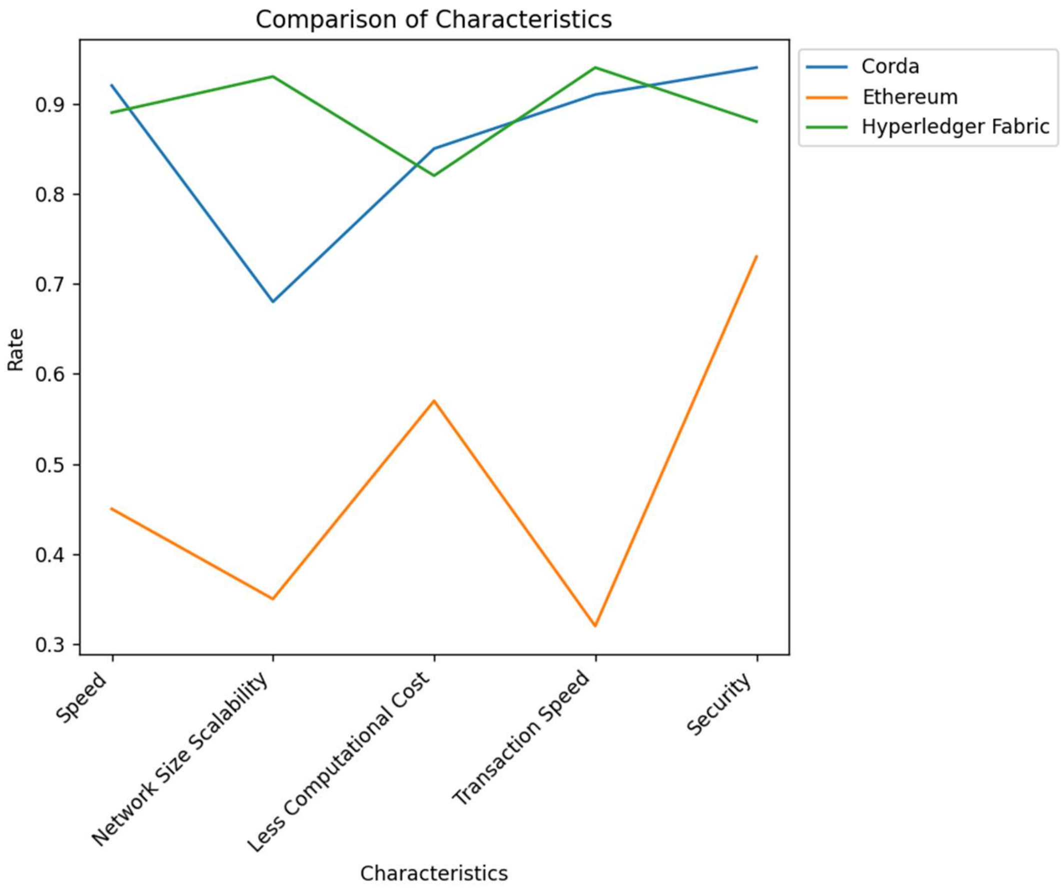

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Fig.8 Line Chart

CONCLUSION AND FUTURE WORK

In conclusion, this research presents a pioneering approach to enhance the credibility and traceability of crowdsourcing services using Corda Distributed Ledger Technology (DLT). When compared to traditional blockchain platforms like Ethereum and Hyperledger Fabric, the proposed Corda framework standsout. Ethereum, while widely used, lacks security measures for identifying malicious nodes. On the other hand, Hyperledger Fabric performs relatively better in terms of security but incurs high computational costs.In contrast, the Corda framework, as proposed inthis work, offers a compelling advantage by consuming significantly fewer computational resources. It focuses on individual nodes rather than the entire network, resulting in aremarkable 80% improvement in latency and throughput. This efficiency makes Corda a promising solution for enhancing the trustworthiness of crowdsourced services while minimizing computational overhead.

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