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NBA Accredited

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A Project Report on

Implementing Comprehensive Blockchain based Framework for Transparent Real Estate Transactions

Submitted in partial fulfilment of the degree of

Bachelor of Engineering(Sem-8)

in

INFORMATION TECHNOLOGY

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1. Project Conception and Initiation

1.1 Abstract

In India currently there are many problems faced by e-governance system in some areas of the public sphere. One such concern is addressing the issues within the traditional property registration system. The existing process is combination of manual process for registration and digital process for storing the records in centralized database. It is time consuming, comparatively less secure and tedious.

To make the entire process secure, digital and decentralized there is need of new design and architecture for the whole system. The proposed solution solves this by making the whole process digital and decentralized using permissioned blockchain technology and a web application.

1.2 Objectives

- To make process less time consuming.
- To bring transparency with the use of blockchain.
- To reduce the fraud cases.
- To make the process of real estate transactions fully digital.

1.3 Literature Review

Authors	Title	Findings
N. Lazuwashvili, A. Norta, and D. Draheim	Integration of blockchain technology into a land registration system for immutable traceability: A case study of Georgia	<ul style="list-style-type: none">• Data security, such as cyber-attacks and data breaches are major reason for adopting blockchain technology to achieve decentralization.
A. Gunda and S. Shukla	Property registration and land record management via blockchain	<ul style="list-style-type: none">• Even after the digitization of the records, they often seems to be out of sync or not up to date.• Permissioned blockchain is more suitable for real estate transactions.
A. Nadeem and S. Jan	A Transparent and Trusted Property Registration System on Permissioned Blockchain	<ul style="list-style-type: none">• Presented techniques are based on Ethereum which unnecessarily consumes ethers for every transaction.

1.4 Problem Definition

- The involvement of middlemen and brokers.
- The increasing number of fraud cases.
- Time delays.
- Lack of digital protection.

1.6 Technology stack

Blockchain

- Hyperledger Fabric
- Docker
- Chaincode - Go

Web Application

- Backend – Node.js, Express.js
- Frontend - HTML, CSS, JavaScript
- Database (session storage) - MongoDB

1.7 Benefits for environment & Society

- Reducing use of paper.
- Preventing frauds.
- Digital way for real estate transactions.

2. Project Design

2.1 Proposed System

Permissioned Blockchain - Hyperledger Fabric

Central Government

- Orderer node
- Certification Authority

State Government

- Channel
- Peer nodes, Ledger
- Applications
- Chaincode (Smart Contract)

2.2 Architecture

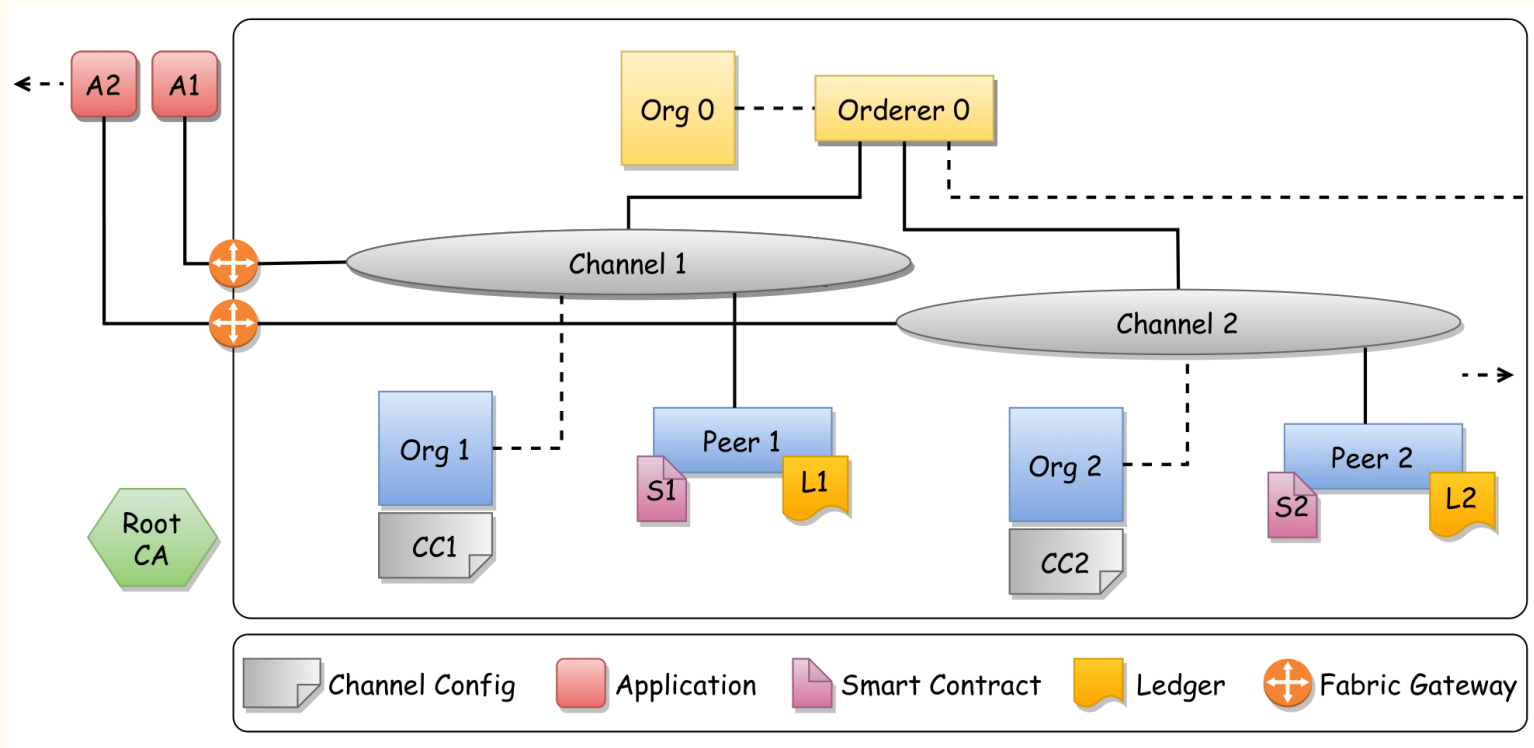


Fig. 2.1 Proposed Fabric Network Architecture

2.3 Description Of Use Case

Central government

- Configure and maintain orderer node.
- Administer Certification Authority.
- Create Channels for all the states.

State governments

- Configure and maintain respective peer nodes.
- Join respective Channel.
- Develop and maintain Chaincode.
- Develop web application.

Users – Registrar, General Public

- Use web applications (A1, A2, etc.)

2.6 Sequence Diagram

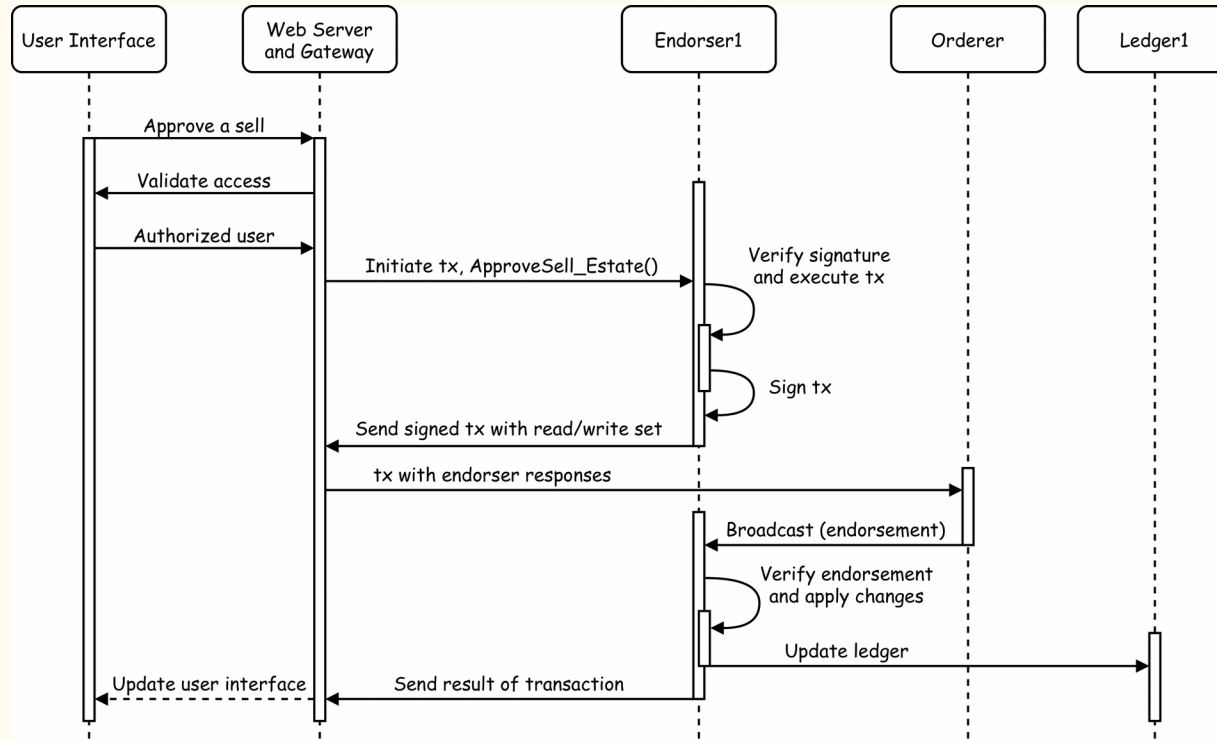


Fig. 2.2 Sequence Diagram – Registrar approving sell of a estate

3. Implementation

3.1 Architecture

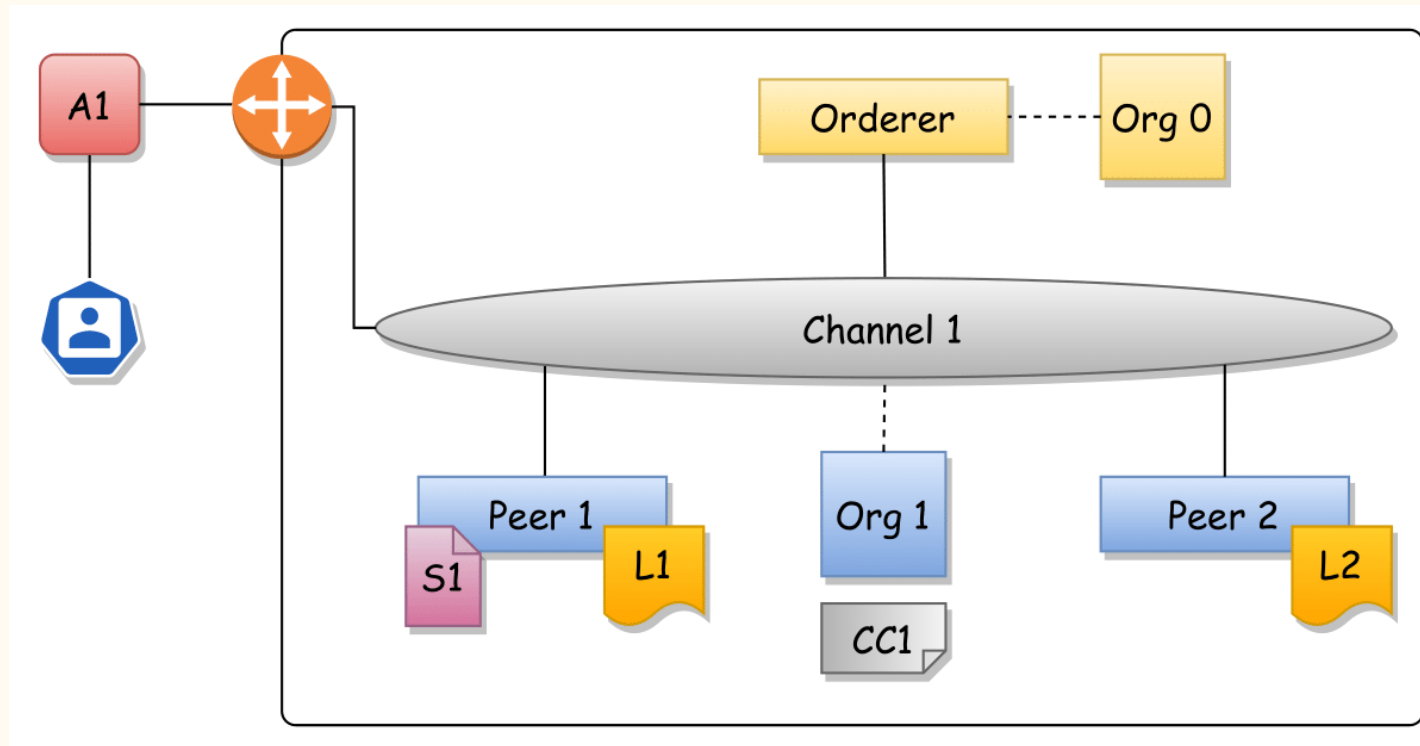


Fig. 3.1 Implemented Fabric Network Architecture

3.2 Use Case

- Implementation for a single state.
- Chaincode development.
- Web application for users.

Process to perform a real estate transaction:

1. Buyer - Verification of ownership
2. Buyer - Send request with proposed price to seller, using ULPIN (Unique
3. Land Parcel identification Number) of estate
4. Seller - Accept the request
5. Buyer - Pay stamp duty and registration charges
6. Registrar - Verify details and execute the transaction

4. Testing and Results

4.1 Throughput Testing

Executing a chaincode method/function using,

- Query operations - Reading data from the Ledger a single peer without consensus.
- Invoke operations – Reading or writing data to ledger with consensus.

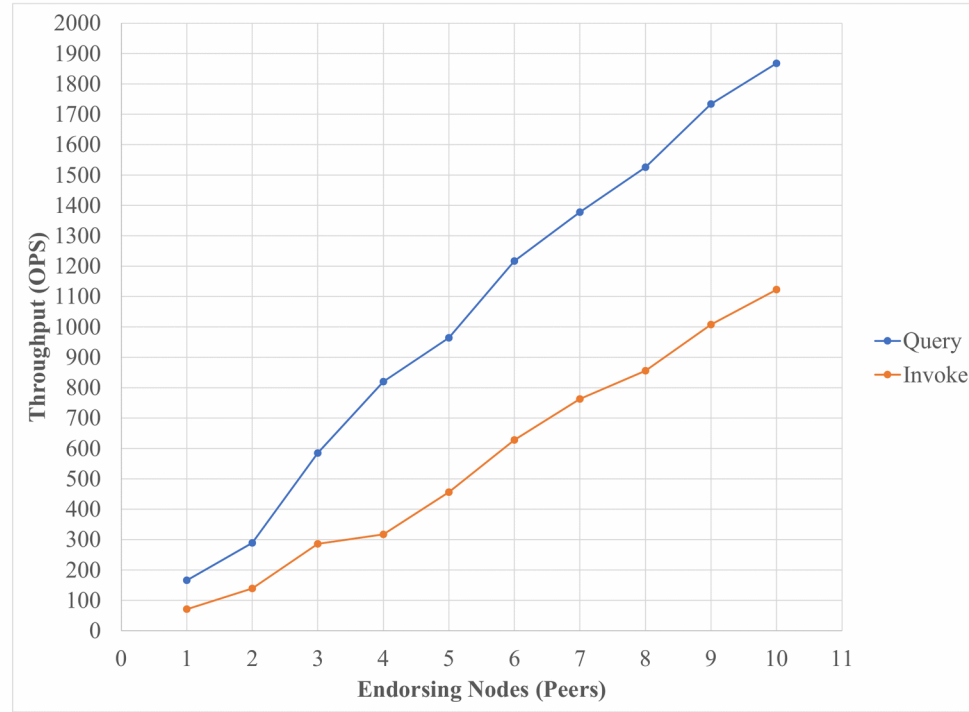


Fig. 4.1 Effect of the Peers Count on throughput of Query and Invoke operations

5. Conclusion and Future Scope

5.1 Conclusion

- Modern solution to prevent and overcome the problems the current World Records Management System in India is facing.
- Decentralization results in secure and temper proof system.
- Use of TLS makes communication between all nodes secure.
- Permissioned nature gives provides decentralization, strict administration and high throughput for transactions.
- for any successful implementation of the technology, seam-less acceptance by stakeholders is required.

5.2 Future Work

- Many additional features can be added to this framework, like more details of the property and its geography.
- The chaincode can be improved and tested to make it more efficient.
- There is a need to handle cases where the property has shared ownership.
- To make the framework a complete solution a native cryptocurrency can be added to do all types of payments.

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Paper Publication

The Paper entitled “**Blockchain based Web Framework for Real Estate Transactions**” was presented at “*5 th International Conference on Computer Networks and Inventive Communication Technologies*” for the Scopus indexed Springer journal by “Rajan Khade, Amit Pandey, Aditya Shinde and Neha Deshmukh”.

Thank You

