



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 Issue: V Month of publication: May 2019

DOI: <https://doi.org/10.22214/ijraset.2019.5310>

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Research Paper on Land Registry Maintenance System Using Block Chaining Technology

Shloka P Turakhiya¹, Chandresh D Parekh²

¹M.Tech, ²Assistant Professor, Raksha Shakti University, Ahmedabad, Gujarat, India

Abstract: *Block chaining technologies are very safe in recent years. The block chain is a distributed digital ledger, decentralized, and keeps track of all transactions made through peer-to-peer network. For any infrastructure, database are highly conserved information. With the growing digitalization, the database are also need to manage digitally. Simultaneously attacks are also raising, therefor it's hard to manage database. Block Chaining is best solution for database management. Block Chaining with decentralized nature gives an integrity, authenticity and transparency of data. The chain of block is beginning to be increasingly explored by various industries that seek the security of confidential data. This document represents the documentation of the application of the Block Chain technological system to the land register. The purpose of the proposed property register management system is to rise the usefulness and efficiency of the current property register management system, through the use of Block Chaining technology for the maintenance of the land register.*

IndexTerms: *Block Chaining, Digital Ledger Record keeping, Land-record, Hyperledger*

I. INTRODUCTION

Block Chaining technology is a database management system that is used for secure data, cheaper and faster transactions. It is an inter-connected and continuously expanding list of securely stored records in a number of inter-connected systems. Block concatenation is the same as distributed general accounting (DLT) technology in which data is distributed across a computer network without being copied. Because it is deployed, modified and different data on the network is deleted. With the chain lock, one computer that has approach to the network automatically receives the changes made to the data. Each of data block is uniquely connected to the last data block via the digital signature. Blocking the chain management network that stores information in a alter-proof way. The real estate division is starting to explore the benefits of blocking. Technology is considered for use registration due to it's capability to manage financial transaction, business transfers. Explain how the chain of blocks could minimize the risk of manual mistake or errors by creating more secure processes to transfer ownership of documents. "One of the best examples of how Block Chaining is adopted in the real estate sector The Digital Street research project is part of commercial strategy of the land register for 2017-2022 to digitize and automate everyday transactions. Making the purchase and sale of real estate is simpler, faster and cheaper. Our choice with its current and previous status, this helps to perform several data audits for its authenticity and usability on the base of its audit trails.

II. KEY CONCEPT

Smart cities are one of the areas of interest of many governments. Many countries have created strategies to turn their cities into smarter cities to gain advantage of opportunities arising from urbanization. Smart cities can be considered as an integration of organic systems, IT infrastructures, physical infrastructures and social and commercial infrastructures. India has launched its mission of smart cities with the goal development of 100 smart cities. The mission for developing smart cities in India was launched on 25th of June 2015 for the goal of becoming 100 smart cities. Many countries have created strategies to turn their cities into smarter cities to gain advantage of opportunities arising from urbanization. Smart cities can also be considered as integration of organic systems, IT infrastructures, physical infrastructures and social and commercial infrastructures. India has launched its mission of smart cities with the goal crating 100 smart cities. This concept was defined by MoHUA. Cities that provide central infrastructure and give decent citizens a good quality of life. Smart cities as defined by MoHUA:

- 1) Citizen Participation
- 2) Identity and culture
- 3) IT Connectivity

Land registry is one of a project of MoHUA. Now a days Land registry is also moving to Block Chaining and many Countries working on Block Chaining Based Land and property registry system. Block Chaining Based system reduced a number of problems in traditional registry. slow registration processes, double registration or one and more ownership, cross-border barriers. The dr. Hernando De Soto, one of the researchers and academics on private property rights, has identified the public records of the earth in

his book "The Mystery of Capital as the Key to Western Economic Success" and stated that such a system is necessarily such that nations in development can unlock it. the "dead capital" of its residents who can not prove their ownership of property documents. The use of Block Chaining to record real estate transactions could also be a more effective property management and will be examined in real time with less administration time in progress. Each terrain property would be uniquely encoded and linked to an intelligent cryptographic key.

A. *What is Block chaining?*

The block chain is one digital database or a ledger, which is distributed through a computer network. The records are protected by cryptography and, therefore, are protected from human errors, modification and deletion. The database is encrypted and stored in a distributed way. Databases are transaction updates every 10 minutes. Whenever a transaction occurs, a "block" is created and published at each node in the network, which can be considered as an entry or group of entries. Each time a "Block" is created, it consists of all transactions which have been occurred in the last 10 minutes. This block is then validated by a high level encryption and connected to the last block or previous block. This is attached to the last block or previous block and so on. In a chain, it's called Block Chaining.

B. *How Block Chaining Technology is more Secure?*

When an one block of data is created and block posted a new block entry to every nodes of network. The block is validated using high level cryptography key and this new block attached to the previous or last block, which is attached to the their previous block, and goes on, it is fundamental a chain of highly secure ledger or database entries. To hack this block of data, or attempt to fraudulently reproduce it, one would need to hack not one computer, but every node of computer, and not just one "Block", however all of the blocks and every one with the very best level of secret writing methodology.

III. ADVANTAGES OF BLOCK CHAINING

Block Chaining is a distributed network technology that stores information or data in tamper-proof manner. Some of basic attributes of Block Chaining which makes this technology unique:

- A. Shared database management system ledger
- B. Provenance
- C. Immutability
- D. Finality
- E. Smart contracts

IV. LAND REGISTRY MAINTENANCE SYSTEM

Land registry management refers to the Land registration or management of all land agreements or transactions undertaken in any geographical rule of a governing authority. In most countries, these registers are maintained with various governmental and local authorities. However, the registration of land records does not grant 'land title', which at times leads to title disputes or debated and costly litigation. Landowners are open to manipulation by individuals or groups with vested interests that can undermine the validity of their property. It is estimated that over 70% of people who own land have a weak or incorrect title. In principle, a valid property title is very important symbol of economic mobility. This is true because you cannot borrow against lands that are not legally yours. The situation is complicated if one considers the impact on the huge majority of people who depend on primary economic activities such as agriculture for their own income, especially in economies like India. There are countless examples all about the world where the land was laid by falsifying documents.

A. *The Key Issues Of Land Registration In India Are*

- 1) *Tenuous Land Titles:* The estimate that approximation 1.3% of the GDP(Gross domestic product) is lost due to unclear land titles. The litigation cost related with matching claims only serves to make worse the problem further.
- 2) *Information Silos:* There is very little centralized databases of all land records are maintained. As a result, most of these records are kept in silos with very little interoperable information that can be accessed by those interested in other platforms. This complex the problems associated with updating and verifying records.
- 3) *Inefficiencies in Record Keeping:* Due to the absence of a platform to maintain a uniform register, there is a good deal of autonomy among the different stakeholders and all records are in the paper documentation. Further, the paper documents are very difficult to maintain. In many cases, this could be inaccurate data along with other inefficiencies associated with such record retention.

Thus it can be concluded that one of the key issues in land registry is the lack of authenticity of land records in the public domain.

B. Why do we need to use Block Chaining to solve Land issues?

We are taking, for example, what happened after the devastating earthquake. While many countries and organizations have done everything possible to help rebuild the nation, a major obstacle has continued to emerge ... there were thousands of plots of land where the legal owner could not be identified and in many cases the owners were in discussion and many problems arise. To date, these problems have had a great effect on recovery efforts. Construction projects are stalled, while the government and contractors expect to solve property problems. Land records suffer similar problems. Many citizens do not trust the system. Some are not sure of legally owning a piece of land, even if they have a legal act. Others who want to buy land are not sure if the seller owns it. When the disaster destroyed paper documents, this would have been reduced by blocking the chain. The solution we are structuring, incorporates many key features and advantages of technology, such as transaction history records, so no one can doubt that the authenticity records are permanently connected to the system so no one can ever tamper with or forge or alter a record of their own and these records can be seen by any party, at any time it is strong and validating.

Block Chaining technology can establish trust, transparency and accuracy in maintaining cadastral data and building a robust record management system. Placing the cadastral data in a data block would make them immutable and tamper-proof, thus ensuring them and creating a solid pillar of trust in the system. Each of the transactions associated with land ownership in an autonomous and efficient manner. All land deeds and their associated records would be unchangeable and unquestionable, thus saving a lot of money on land-related legal action. The cost of physically archiving these records and the large amount of documents associated with verifying the details on any property would be reduced. This, in turn, would save time and advance transparency in the land tenure management system.

V. THE ADVANTAGES OF A BLOCK CHAINING BASED LAND REGISTRATION SYSTEM

- 1) *Tamper Proof Record Land Records:* The secure nature of the Block Chaining creates a registration system that is tamper-proof, final and unchangeable or fixed. This reduces the scope of forgery or manipulation.
- 2) *Unified Registration System:* Unifying the land registration process under a single digital platform would create uniformity and remove the existence of official bases. This would help increase efficiency and further reduce red tape and inaccuracies or forgeries.
- 3) *Transparent Registration Process:* The Block chaining could help automate the process of registration through the use of smart contracts intermediating human beings that are vulnerable to falling prey to corrupt.

VI. PROPOSED LAND REGISTRY MAINTENANCE SYSTEM

Efficiency of the present or ongoing Land Registry Management System, by using the Block Chain Technology for Land Registry Maintenance functionality. This system will be valuable to the Project Owners because it adds value to existing Land Registry Management System and makes the existing Land Registry Management the most useful system for its end users. Different Channels can be used to handle the Features of this Product. Static and mobile devices also can be used for this product. Remote and contact devices can operate systems. Web applications and mobile applications are provided to manage systems for verification and validation. Block Chaining based land registration technology is one of the "smart contracts", which are pre-programmable contracts that are automatically executed when certain conditions are met and provide the capacity to complete transactions much more quickly if combined with a record in a chain of blocks.

For example, the property title could be transferred to the buyer automatically upon receipt of funds in the seller's account. The result would also be to increase the registration process. With the immediate update of the general ledger, the registration gap would be eliminated. This, in turn, would also lead to greater effectiveness and cost savings and less processing time for land registry.

A Block Chaining based land registration system can go a long way in addressing some of the issues that exist in land registration today. A potential approach for undertaking a land registration transaction between parties over a Block Chaining Technology would involve the following actors:

- 1) *Buyer and Seller:* Seller wants to sell a land property with an officially legal procedure to follow for the selling of the land property. Buyer does verification and validation for the purpose of being sure if the seller is the legal owner of that land property and follows the process for purchase of the land property.
- 2) *Relevant Land Record/Survey Authority:* Validates the name on the agreement documents against the buyer's identity and checks the receipt of the stamp duty. It is responsible for authenticating the unique identity of the buyer and seller and ownership of the property based on the regulations specified by the government.

- 3) *Office of the subregistrar of Assurances*: Validate the receipt with the stamp, the deed of ownership, the ownership card and proof of valid identification and If the registration process has been finished in timely-manner.

VII. HYPERLEDGER PLATFORM

Hyperledger is a not a block chain or not a currency but hyperledger is a project of open source block chain and related tools for development Platform. The hyperledger project was started in December 2015 by the Linux Foundation and supported by industry players like IBM, Intel and SAP Ariba.

A. Hyperledger Framework

- 1) Hyperledger Burrow
- 2) Hyperledger Fabric
- 3) Hyperledger Iroha
- 4) Hyperledger Sawtooth
- 5) Hyperledger Indy
- 6) Hyperledger Grid

B. Hyperledger Tools

- 1) Hyperledger Composer
- 2) Hyperledger Caliper
- 3) Hyperledger Cello
- 4) Hyperledger Explorer
- 5) Hyperledger Quilt
- 6) Hyperledger Ursa

VIII. HYPERLEDGER FABRIC

Hyperledger Fabric is an open source framework for making private or permissioned block Chaining business networks, where identities and roles of members are known to other members. The network built on fabric serves as the back-end, with a client-side application front-end. SDK's are available for Nodejs and Java to build client applications, with Python and Golang support coming soon. You can make building for your own blockchain applications using hyper ledger Fabric. It makes different from other known blockchain systems in case of private and permissioned. Before participants can be part of the network, all contributors must be enrolled through a trusted Membership Service Provider. Without verification of participant no transaction is permitted. There is no need for proof-of-work or other protocols that are used in Bitcoin or Ethereum, when all participants are known. A participant in permissioned network can be allowed invoke smart contract, but not allowed to deploy a new one. A separate channel can be created for private, confidential transactions. Participants of the channel can only view the data. Distributed ledger is shared between all nodes. It is contain two data structures-: transaction log and world state.

The transaction log cannot be replaceable and is built in. New world state is agreed and written after accepting new block with transactions. World state describes the end state of sequential transactions.

A. Nodes

The system contains three types of nodes: peers, client and orderers. The client is the node that represents the end-user. Also it connects to peers and orderers for updating the data. SDK is provided in Java, JavaScript (Node.js) and Go. Chaincode means peer managing digital ledger data, transactions and runs smart contract.

The ledger consists of two components

- 1) Transaction log
- 2) World state

The transactions change the world state by using chaincode. Transaction considered as a deploying a new chaincode. The chaincode will be signed and system creates an unchangeable package of the chaincode. A separate Docker image is created with version tag and it is running as a separate machine. This will ensure that the peer will not crash without something happens within the chaincode. Peers will run the chaincode on a channel, a separate ledger, and one peer can run multiple channels. Hyperledger Fabric depends on certificates, the same ones used by HTTPS protocol. In certificates every move is signed, so there is no users in perspective of system. Advance certificates can be created, but for enterprise applications that would be too static, there for a

separate service called Fabric CA is provided to dynamically generate certificates for users. Persistence is provided by MySQL, PostgreSQL or LDAP server. Orderer is agreement service that purpose is to quarantine that for all participants, their all transactions would be same in order and it send them as a block to all peers, which will persist as a block to the ledger. There are multiple implementations supported, SOLO a single instance well-known distributed streaming platform for developing and Apache Kafka. Kafka used Apache ZooKeeper, well-known coordination service, for providing group services, distributed synchronizing and maintaining configuration information. The work of adding Simplified Byzantine Fault Tolerance is on the way. This is one of the strengths of the system, it is built modular and is possible can change the consensus service as needed. Each peer has a world state database kept in a key-value store LevelDB or document-oriented database called Apache CouchDB. Latter enables chaincode to execute complex queries on blockchain data.

B. Chaincode

Chaincode known as a smart contract in Hyperledger Fabric. It is a program, written in Go, Node.js or Java language. The lifetime programming language developing vast libraries enable to use. Chaincode runs in an isolated Docker container. For that to use existing API and make the migration easier. Chaincode purpose is to be the business layer in software development. Deployment of new chaincode is two-step process. In the first step the code is deployed to all peers file system. Second step is called instantiate for new code and upgrade for upgrading existing chaincode. The second step is for actually deploying the code into production. Deployment of chaincode going through the same process as transactions and requires that all peers sign the new chaincode. When deploying new chaincode, it is possible to assign policy, of which peers must sign transactions running this chaincode. Chaincode can be deployed via CLI or by using SDK. To implement permissioned ledgers, platform offers channels. Chaincode is running on the channel as a separate ledger. Same Chaincode can run on different channels, similar how same server software can run on different client environments. It is possible to invoke other chaincode and even chaincode in another channel. Channels can be used to keep private data safe to other members. When channel is set up between subset of members, the blockchain data is physically available only to the participant's nodes. Hyperledger Fabric latest adds a possibility to encrypt part of data using built in functions. Use this built in functionality enables even querying the encrypted data. The safekeeping of encryption key is trusted to the client. Processing of transactions, Transaction management is split between peers and orderers. This allows higher parallelism and concurrency for the network. Every transaction is executed in the peer using world state. If the transaction succeeds, it is signed with Peers certificate. Executing transactions before ordering allows each node to process multiple transaction at the same time. The orderer will not re execute the transaction, just order them and do not maintain ledger. This also enables the peers to trust all orderers and vice versa, so they can run independently. Peers are divided into endorsing peers (peers that contain specific chaincode and are part of the policy) and peers without the chaincode. Peers without the chaincode can still validate and commit the transaction to their ledger after receiving it from the endorsing peer.

IX. HYPERLEDGER COMPOSER

Hyperledger Composer is a set of Javascript based tools and scripts which simplify the creation of Hyperledger Fabric networks. Using these tools, we can generate a business network archive (BNA) for our network. Composer broadly covers these components:

A. Business Network Archive

Composer allows us to package a few different files and generate an archive which can then be deployed onto a Fabric network. To generate this archive, we need:

- 1) *Network Model*—A definition of the resources present in the network. These resources include Assets, Participants, and Transactions. We will come back to these later.
- 2) *Business Logic*—Logic for the transaction functions
- 3) *Access Control Limitations*—Contains various rules which define the rights of different participants in the network. This includes, but is not limited to, defining what Assets the Participants can control.
- 4) *Query File (optional)*—A set of queries which can be run on the network. These can be thought of as similar to SQL queries.

B. Composer Playground

Composer Playground is a web based user interface that we can use to model and test our business network. Playground is good for modelling simple Proofs of Concept, as it uses the browser's local storage to simulate the Block chaining network. However, if we are running a local Fabric runtime and have deployed a network to it, we can also access that using Playground. In this case, Playground isn't simulating the network, it's communicating with the local Fabric runtime directly.

C. Composer REST Server

Composer REST Server is a tool which allows us to generate a REST API server based on our business network definition. This API can be used by client applications and allows us to integrate non-blockchain applications in the network.

X. IMPLEMENTATION

- 1) Installing the prerequisites, tools, and a Fabric runtime:
 - a) Docker Engine and Docker Compose
 - b) Nodejs and NPM
 - c) Git
 - d) Python 2.7.x
- 2) Installing tools to ease development
- 3) Installing a local Hyperledger Fabric runtime
- 4) Generating a Land registry network
- 5) Modeling land network
- 6) Adding logic for our transactions
- 7) Defining permissions and access rules for government body and buyer-seller
- 8) Generating a Business Network Archive (BNA)
- 9) Install and Deploy the BNA file
- 10) Generating a REST API Server
- 11) Generating an Angular application which uses the REST API

A. Features Of Proposed Land Registry

- 1) Block chain based land registration system.
- 2) Find out how blockchain could minimize the risk of manual errors by creating more secure processes to transfer ownership of documents.
- 3) The system will run as a service, Mobile Service or a Web service.
- 4) The system will load Records of our choice with its Current and Previous Status. This helps in conducting various Audits on the Data for its Authenticity, Sanity, Sanctity and Usability based on its Audit Trails.
- 5) The system will have the capacity to handle submissions via an application or a Web page.
- 6) Land Registry Management System is a software component designed to assist users of the software to get Local and Global Perspective of Data with Better Control and Manageability.
- 7) The better mechanism to analyse data, provide various reports and dashboards on demand basis.
- 8) By using Block Chain Technology, the storage mechanism is in a Distributed way with the Centralized Control of Major Control Parameters and Centralized Reporting Systems and Local Data Maintenance and Querying Systems.
- 9) Digitized record & accurate data.

XI. CONCLUSION

Block Chaining technology is solution for manual problems that arise out of transacting data and digital asserts. Implementing a application of Block Chaining as a part of Digitization or urbanization. Block Chaining Framework for implementing a vision of forward and modern urbanization.

Block Chaining Land registry solve the problem of untitled land, keep record of particular land. Block Chaining based Land registry system saving money and time which is passed for the paper documentation on the land related litigation. Proposed system storing the land document as digital aspects it reduced paperwork registration of land is tamper proof manner. The Block chaining based land registry approach assume that a land or property identity is available in a trusted manner on network.

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