Land Registration Using Ethereum Blockchain

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Abstract:- Land registration is a very slow and bungle some process. It involves a lot of intermediaries in the process of land registration, which leads to unnecessary spending. It is also a lengthy process and eats our time. Developing a system that is not only accelerate the process of land registration, but also makes it easier for the users (buyers and sellers) and government officers to transfer the land title from seller to a new buyer. it can be viable with the aid of creating a allotted system that stores all of the transactions that are made at some point of the manner of land ownership.

Here I am trying to implement is based on Ethereum Block chain which will store all the transactions made throughout the system of land possession switch. Blockchain has a concept of smart contracts, by using this, we can trigger various events like fund transfer from buyer to seller after successful completion of the land ownership transfer and accessing of land records to a land inspector. This blockchain technology will solve the problems faced by all the three parties (buyer, seller and government officials)during the land ownership transfer, and it will also remove the intermediaries like property dealers. This system design makes the process of land registration resilient and decreases the cases offrauds in the registration process. By using Land registration using Ethereum blockchain, validation of the land registration is additionally viable as immutable transactions are being saved in the public ledger (PL).

Keywords:- Blockchain; Transactions; Smart Contracts; Immutable; Land Registration.

I. INTRODUCTION

A blockchain is a distributed or decentralized ledger where each node in the network has access to the records storedin a blockchain. The encryption of all the important data records in the blockchain are done by using cryptographic techniques.This guarantees the safety of the statistics or information insidethe blockchain. The primary idea behind blockchain technologyis to create a network of various computers or users, referred toas nodes, that can conduct safe and valid transactions without the involvement of third-party intermediaries. Each authorizednode that is a part of the network can access the set of recordswhich are added as a legitimate block in the blockchain. It makes the blockchain system an immutable, distributed digital public ledger that can record financial transactions as well asother types of transactions.

The first block in the blockchain is referred as "Genesis block" which is hardcoded into the software. Because there is no parent block to refer. Each block in the blockchain contains block header and block body. The block header includes block model which shows which set of block validation policies to stick. The parent block hash is a 256-bit hash value that refers to the previous block. Merkle tree root hash, which is the sum of all the hash values in the block. It can be used to verify any kind of data stored, handled and transferred in and between computers.
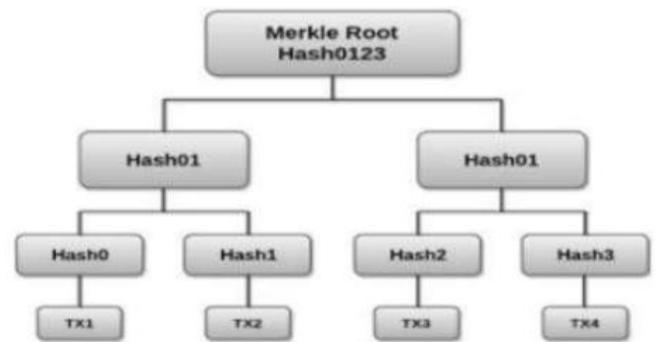

Fig 1. Merkle Tree

Timestamp refers to the current time in seconds since 1970-01- 01T00:00 UTC. The current hashing target in a compact format is nBits. Nonce is a 4-byte field that typically begins with 0 and increases with each hash calculation. A transaction counter and transactions make up the block body. The maximum number of transactions that a block can contain depends on the block size and the size of each transaction.
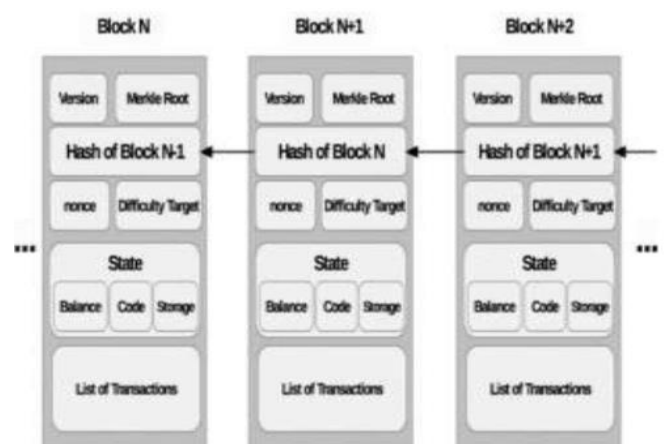

Fig 2. Structure of Blockchain

The hash value is being used to link each new block in the chain to the previous block. Each block's hash is like a unique fingerprint. The hash value identifies a block and all its contents. As a result, once a block is created, any change within the block will cause the hash to change. This is the method used to ensure the security of a blockchain, but computers nowadays are extremely fast, capable of calculating hundreds of thousands of hashes per second. An attacker can tamper with a block in a matter of moments and then recalculate all the hashes of other blocks to make the blockchain valid again. Blockchains use the consensus algorithms concept to correct this issue.

A consensus algorithm is a protocol that allows all parties in a blockchain network to reach an agreement (consensus) on the current state of the ledger and trust unnamed peers in a distributed computing environment. However, the time required to verify the results of the computational problem is insignificant in comparison to the effort required to solve the computational problem itself. Because this mechanism makes it difficult to tamper with the blocks, even if you tamper with a single block, you will need to recalculate the proof-of-work for all subsequent blocks. As a result, hashing and consensus mechanisms ensure the security of a blockchain.

II. LITERATURE REVIEW

Land title is one of India's most contentious topics. It lacks a correct scheme for maintaining property or asset documents and providing the outcomes of rare and long drawn legal conflict to an individual with conclusive titles. Now a days in India land title or ownership does not ensure its full rights to an owner. In addition, property transactions are carried out on paper and are not very frequently updated, resulting in countless conflicts over property. Land or asset documents are centralized and preserved in the sub-registrar's office in India. It is also possible that the record may be altered or manipulated or damaged. Challenges in the current Land Registration System:

- Ownership Verification: One of the challenges faced by land registration authorities worldwide is to ensure ownership verification to transfer the title to the newly bought buyer.
- Ownership History: Many properties do not have a correct recorded ownership history in many cases. When negotiating
- with unknown people, having access to the whole ownership title history for an asset (e.g., a block of land) or property enhances trust.
- Unauthorized sale of lands: Properties might get sold without authorization causing financial damage to the owners or insurance companies.
- Delays in Ownership Transfer: Paper based land or asset registration and ownership transfer are prolonged taking more time. Inaccurate property value might result in improper tax or insurance premiums.
- Failure to detect scams: Current paper-based or digital records fail to prevent frauds and identity theft that could lead to illegal sales.

To take purchase decision, it is required high-quality, accurate, and timely information. A clear vision could be difficult to obtain as several factors contribute to property value. Current heterogeneous data silos, the myriad of information sources, and their mutual distrust (e.g., buyers and sellers or banks and buyers) make things even more difficult. New mechanisms are required for guaranteeing transparent, trust, and traceable data flows in negotiating and transacting the ownership or title of properties.

Issues related to paper-based registration:

- Paper-based documents: which can lead to modification or damage.
- Inefficient due to heavy reliance on multiple third parties or mediators.
- High transaction cost
- A prolonging of the time in which property transaction is completed.

A. E-Registration

After paper-based land registration, e-registration came into picture. It also has some pros and cons due to which we are looking for better solution. But, based on current situation it is also not a solution to do land registration. Land title or ownership transfer involves sensitive things which cases big effects. Small mistake can lead to transfer to a wrong person. Issues related to e-registration:

- E-registration is a centralized method, and all information will be lost if there is a crash in the system, so it's not that safe.
- Due to poor implementation of system, individuals are unable to process their application and thus flood the helpdesks.
- The system is not safe because of possibility of hacking.
- Since some of the processes are manual, records could be manipulated.

III. PROPOSED SYTEM DESIGN

Here I am implemented Land Registration using Ethereum Block chain. The transparency nature of blockchain could make it possible to trace how property is changed in hands. Blockchain's immutable, auditable and traceable features are enticing government officials around the world to implement the decentralized technology in the land registration process. Land registration on the Ethereum blockchain will alleviate the challenges that all three parties have throughout the land registration or title ownership title process, as well as eliminate the need for intermediaries such as real estate agents.

Step 1: User Registration to the platform with his/her details by using valid government ID proof. The request will be assigned to their respective police station. On successful validation of details, the user can get credentials to do transactions on their own.
Step 2: Seller uploads the property specifications.
Step 3: Once the seller uploads the property details, then all the authorized buyers can view property details. If any buyer likes to buy that property, then the buyer requests access to

the listed property. Then that request will be sent to seller. The seller may accept the request or reject the request. If seller rejects, then the buyer will get the notification of rejection.

Step 4: Seller approves the transfer request and Register Officergets the notification.

Step 5: Verification of transactions by Land registration officer and initiation of the transfer. Registration authority or land inspector verifies the data submitted by buyers and sellers and uploads the validated records to the blockchain land registry platform.

Step 6: Registered Land Data Validation and Authentication. Sale amount or ethers will be transferred from buyer to seller as soon as the details are validated.

Figure 3. Proposed System Design

First step in the development process is to setup the environment for the application. First, I installed all the required tools for the development. Those are truffle suite, node js, ganache, npm, python and sql.

In the second step of development process is back-end development. I implemented smart contracts for the Registration Process. Smart contracts are programs that run as they have been set up to run by the person who developed the contracts. Python language is used for writing the smart contracts on Ethereum blockchain platform. The Ethereum blockchain may be communicated with using the Python package Web3.py. It's most seen in decentralized apps, or dapps, to aid with sending transactions, engaging with smart contracts, accessing block data,and several other tasks. The Web3.js JavaScript API is used to serve the API. Flask is a Python web framework that includes tools for creating lightweight web applications. Armin Ronacher, who heads a worldwide network of python fans, created it. It is built using the WSGI toolkit and the Jinja2 template engine.Flask is an example of a micro framework.

The third phase, after building the back-end programs, isto construct the front-end application. The front end is used to interface with the smart contracts. I used JavaScript, HTML, and CSS to create the front-end.

The fourth step is to connect to blockchain. After installing the ganache and truffle suite, I have created a Land Registration workspace to do transactions with this workspace.

After creating workspace, we will get 10 accounts along 30 with details about the server, gas limit, gas price etc. Each account gives 100 ethers for the sake of transactions. In the last step, after connecting to the Block chain, the seller and buyer can do the transactions under the inspection of Registration Officer.

IV. RESULTS AND DISCUSSION

Figure 4 is the Login page of this application. The user or authorized person can login to the platform by using sign in. New user who is buyer or seller can register to the platform by using Register. If any user forgot the password, then they can have the new password after authentication on valid details.
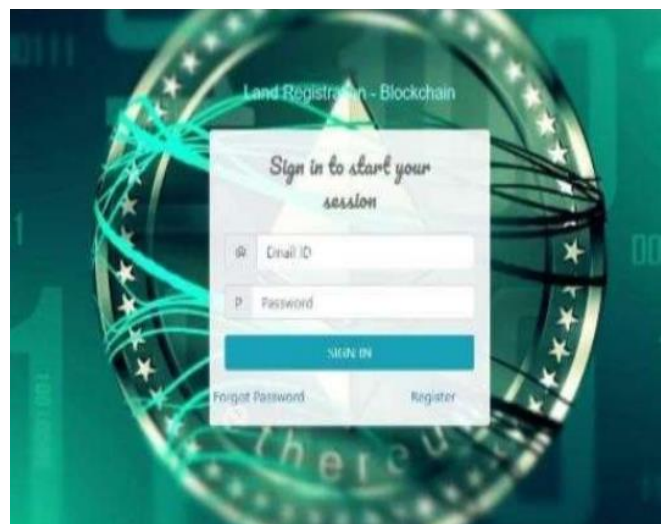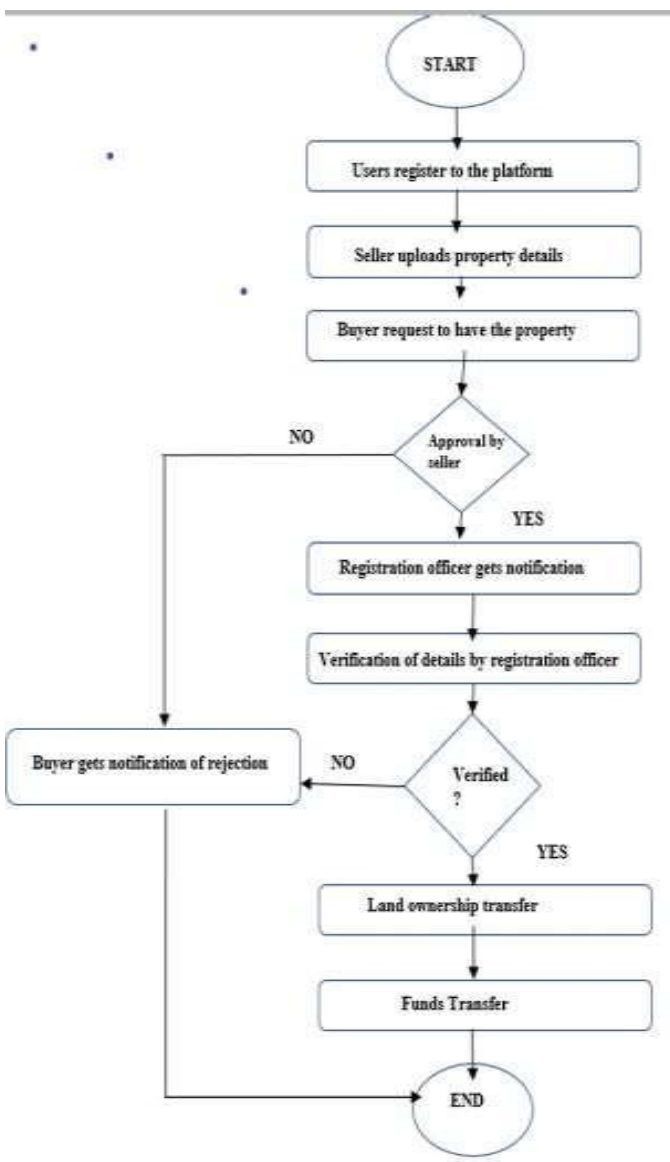

Fig 4. Login Page

After successful login, we can see various tabs in Figure 5. By using person tab, the seller can sell the property and buyer can buy.

Fig 5. Home Page

Fig 6. Balance Deduction

The amount deduction after successful Figure 6 shows transaction.

Figure 7 shows the transaction hash which is unique to each transaction. We can see from address, to address and transaction data in that figure.

Fig 7. Transaction Hash

V. CONCLUSION

Land registration, also known as title transfer, refers to the process of recording ownership, occupancy, and other rights in land (typically with a government or agency) in order to establish evidence of title, ease transactions, and prevent illegal disposal. The information that is recorded and the level of security that is granted may differ depending on the jurisdiction.It is a process of officially and legally recording land or built property rights 6 through deeds or title certifications. It publicly shows that there is an official record of ownership title with inherent rights through that ownership. Land registration is implemented using the blockchain which offers a more secure platform compared to its predecessors. For the land transaction to be secure, an algorithm called SHA256 is used which helps to create a unique hash for every block. Once the hash value of a transaction is obtained it is not possible to obtain the original message through trial-and-error method. The Blockchain technology is emerging very rapidly due to secure features it offers. Hence using Land Registration System using Ethereum Blockchain we can complete the Registration process early without any third party. By using smart contracts, we can trigger the events on conditions. We can also store immutable transactiondetails.

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