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Online Land Registration Using Blockchain Technology

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ABSTRACT_ Land registration is a lengthy and time-consuming process in many countries, including India. Additionally, there are a number of intermediaries involved in the land-registration procedure. Developers are working to create a system that will speed up the land registration process, as well as make it easier for buyers, sellers and government registrars alike to transfer the ownership of land from the seller. Due to the fact that ownership will only be transferred manually, this could pose a security risk at times. It is not uncommon in many countries to hold land registration authorities liable for suspected mismanagement and manipulation of land data. Because of this, a given piece of land can be claimed by a variety of parties. This data has become substantially more vulnerable to security concerns because it has been centralised. Research into decentralised systems has sought to improve their reliability. Blockchain-based decentralised solutions are currently being developed to address the shortcomings of centralised systems. Our goal with this project is to develop a proof-of-concept system or framework for future applications based on substantial land record registration models.

I. INTRODUCTION

All stakeholders who have a direct or indirect stake in land registration in any country are required to be involved in the process of land registration. For example, the server used to store land record title information is vulnerable to natural disasters, which could bring about data fraud and security difficulties, as well as the possibility of the system failing completely. Blockchain is a cutting-edge technology and database that has the power to totally eliminate the issues that afflict present systems. In a decentralised network, any data produced by one node must be verified by other nodes before it can be stored to the blockchain. This is the most fundamental and significant component of blockchain technology.

Securing and protecting land data has necessitated a number of attempts at mapping land records to this new technology (blockchain). When it came to developing a plan for using blockchain technology into their projects, the UAE was a pioneer. When it came to putting land titles on a blockchain, the Dubai Land Record Authority was one of the first. Security, resilience, and traceability are still major problems, despite the fact that documents and other data have been digitalized. As a result of a lack of land register system infrastructure, property records are particularly susceptible to inconsistent, inaccurate, and altered data.

Blockchain technology provides a secure and dependable decentralised ecosystem. Transactions involving land titles are being handled via a system for managing land management and recording title facts. In order to protect these records from falsification, land management and title catalogue systems must be robust, and these procedures must be completed in a timely way. Since its inception in 2009, blockchain has evolved into a hybrid of numerous technologies, such as mathematics and networking as well as cryptography and a distributed consensus method.

Since Satoshi Nakamoto's 2008 Bitcoin paper, the blockchain has evolved significantly. All participants (peers) are nodes in a peer-to-peer network, and all nodes retain the information. The blockchain is a public ledger that is distributed throughout a network and is used to record transactions between members of the network. Decentralized blockchain technology provides security and robustness without relying on a single authority, such as administrators who can counterfeit the database. This power can be misused by untrustworthy administrators. As a result, when something goes wrong with a typical database, it's necessary to fall back on a copy of the data in case something goes wrong. As a result of this failure, if both backups and an operational database are exploited, it is disastrous.

Transactions involving land titles are being handled via a system for managing land management and recording title facts. Land management and title cataloguing processes must be robust in order to prevent falsification, and these

processes must be finished in a short period of time to ensure the availability of these data at all times. A digital register is also a function of the blockchain. Proper land registry systems are used in Blockchain-based land registry schemes. At the same time, blockchain has a record of who owns these assets and when they were transacted, so it can prove ownership.[1]

II. LITERATURE SURVEY

In order to build and operate together on a secure application development that produces financial results, many corporations learn to form alliances with other firms with similar goals. Crowdfunding platforms, on the other hand, protect the data by enforcing strict access control procedures, which if breached can result in fines and legal action against the perpetrators. As a further benefit, if numerous companies are participating, they can each implement their own security algorithms and access regulations to ensure that privacy is evenly distributed over the network.[3] However, intermediaries are permitted to play a role, however they cannot be fully omitted from the process. The advantages of such a challenging technology can be well gained if it is integrated with other prominent technologies such as cloud to promote heavy data stores, IoT to promote high data capture abilities, etc., Traditional blockchain-based smart contract creation does not allow for repeat execution of a collection of statements based on the fulfilment of a condition. However, this is critical when a decision-making system is to be derived from several statements. If the data is dynamic rather than fixed state, and if firmware is available to evaluate the data, standard experimentation methods fail [4]. [4] Since the code must be written in accordance with the above issues, the code must be written in such an order to facilitate smoother execution throughout the nodes. In addition, a software testing framework that is compatible with this will be developed to achieve better results. As long as this is implemented, many smart homes based on blockchain-based secure data will benefit from the implementation.

Security, secrecy, and authentication can be addressed by combining blockchain with other technologies, such as machine learning, IoT, and data analytics. With respect to new data types, different blockchain implementations address different real-time scenarios. Even though ethereum has proven to be effective at proving security and decentralised qualities, scalability remains an issue. Compromise on decentralisation is out of the question if users desire superior long-term benefits [5]. Instead than emphasising distributed flow, customers seeking immediate gratification should pay attention to issues like as scalability, security, and transparency. To take advantage of the advantages of openness and safe accessibility, a combination of public and private blockchains can be deployed. In order to get the best results, the server must be able to produce numerous unique addresses for each user who performs an activity on the blockchain.

One of the most difficult, yet highly desired, properties is the capacity to establish trust among several nodes while also allowing for legitimate and safe access to the stored data. When it comes to the land registration system, users' identities are kept secret and only land that has been thoroughly vetted is put for sale. In the current arrangement, the entire system is also controlled by a single controller. According to [7], scalability remains unproven, which has a significant impact on all aspects of the distributed blockchain network.

III. PROPOSED WORK

Even though commercial real estate and land registration systems are using digital data, they lack transparency, trust, and efficiency due to the fact that the data is housed in various systems. With respect to the state of Maharashtra, we want to implement a modest module of the land registration process.

This is why we are proposing a private and permissioned blockchain architecture that restricts the number of users who may participate in consensus. Asymmetric cryptography protects users, while distributed consensus techniques ensure the integrity of the ledger. It is a combination of decentralisation, persistence, anonymity, and auditability that leads to lower costs and greater efficiency and dependability. A traditional, centrally-controlled system forces observers to rely on the authority of the central authority to check and authenticate their claims, whereas blockchain allows anybody to verify the validity of the system's state. As a result of this configuration, each state transition is certified by verifiers that can be limited to a subset of peers only.

A Put for Sale and a Change of Ownership smart contract is used to sell and acquire land on our portal, which takes into account all of the land user's credentials and validated paperwork. Only the user can buy or sell the land if all of the essential conditions have been met. One can review all the previous owners, the date of purchase, and summary of all land facts after the deal has been completed. Lands can be sorted by area or land id, depending on the preferences of the user. As a result, our system is effective and meets the demand for a decentralised land management system that has been changed.

IV. IMPLEMENTATION

1)Propose Transactions: The Client Application proposes a transaction to multiple endorsing peers. The number of peers is determined by the endorsing policy. The client application needs to satisfy this Endorsement policy to communicate with enough peers to collect endorsements.

2)Execute Proposed Transactions: Each of the endorsers has to execute the transactions proposed. Each execution will capture read and write sets. Once captured these sets are collected for the transaction and each endorser will sign it.

3)Proposal Response to Client: Endorsers communicate back to validate the output with their signature. The client or SDK will now receive the read and write sets asynchronously.

4)Ordering Transactions: Once the client gets sufficient endorsements according to the endorsement policy, it will submit the transaction to the ordering service. Multiple client applications or users across the network simultaneously send their transactions to the ordering service. Ordering service determines how to order the transactions and also ensures that all peers on the network can see the same order.

5)Deliver Transaction: Ordering service delivers ordered sets of transactions(block) to all the peers in the network, it asks them to add this block to their blockchain.

6)Validate Transaction: All peers receive a block of transaction, but not all transactions in the block are valid because some of them do not get sufficient endorsements. When all peers on the network come across such invalid transactions, they reject or mask that transaction.

7)Notify Transaction: All peers, on a per peer basis, commit a set of valid transactions(block). This block is then added to the blockchain and each block emits events to notify that the block has been added. Events may be block events, transaction level events or smart contract events.

V. METHODOLOGY

A blockchain is a growing list of records, referred to as blocks that are cryptographically linked together. A cryptographic hash of the preceding block, a timestamp, and transaction data is included in each block (generally represented as a Merkle tree, where data nodes are represented by leaves). The timestamp verifies that the transaction data was there at the moment the block was released, allowing it to be hashed. Because each block contains information about the one before it, they create a chain, with each new block strengthening the preceding ones.

As a result, blockchains are resistant to data tampering since the data in any one block, once recorded, cannot be changed retrospectively without affecting all subsequent blocks. Based on work by Stuart Haber, W. Scott Stornetta, and Dave Bayer, the blockchain was popularized by a person (or group of persons) using the name Satoshi Nakamoto in 2008 to serve as the public digital ledger of the cryptocurrency bitcoin. Satoshi Nakamoto's true identity is still unknown. Bitcoin became the first digital currency to overcome the double-spending problem without the use of a trusted authority or central server when the blockchain was implemented. The bitcoin architecture has influenced other open-source programmes and blockchains that are commonly utilised by cryptocurrencies. The blockchain may be thought of as a form of the payment system.

The structure of data in a blockchain differs significantly from that of a traditional database. A blockchain is a digital ledger that collects data in the form of blocks, which contain sets of data. Blocks have specific storage capacities, and when they're full, they're closed and linked to the previous block, forming a data chain known as the blockchain. All new information added after that newly added block is compiled into a new block, which is then added to the chain once it is filled.

A database organizes data into tables, whereas a blockchain organizes data into chunks (blocks) that are strung together. When implemented in a decentralized manner, this data structure creates an irreversible data timeline. When a block is filled, it becomes a permanent part of the timeline. When a block is added to the chain, it is given an exact timestamp.

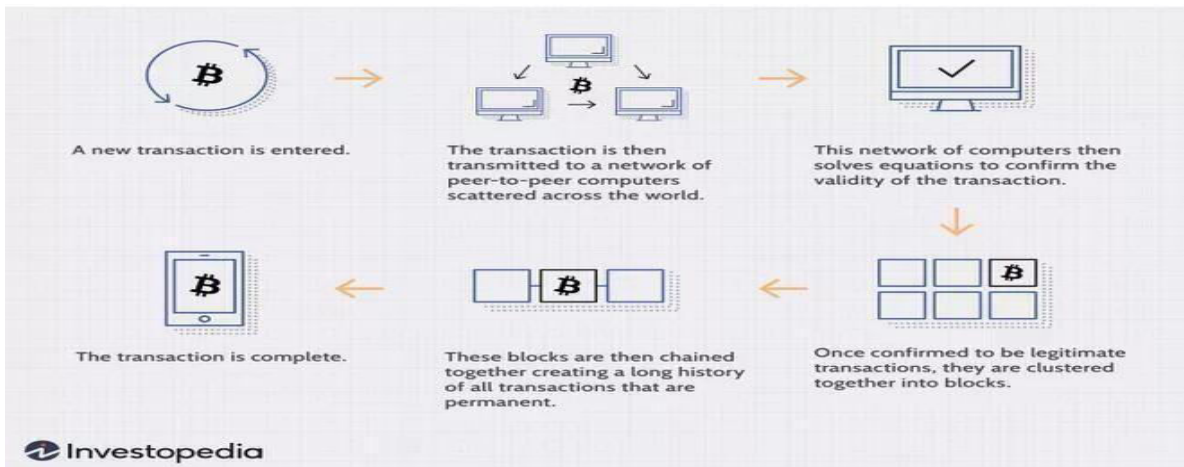


Fig1:Transaction Process

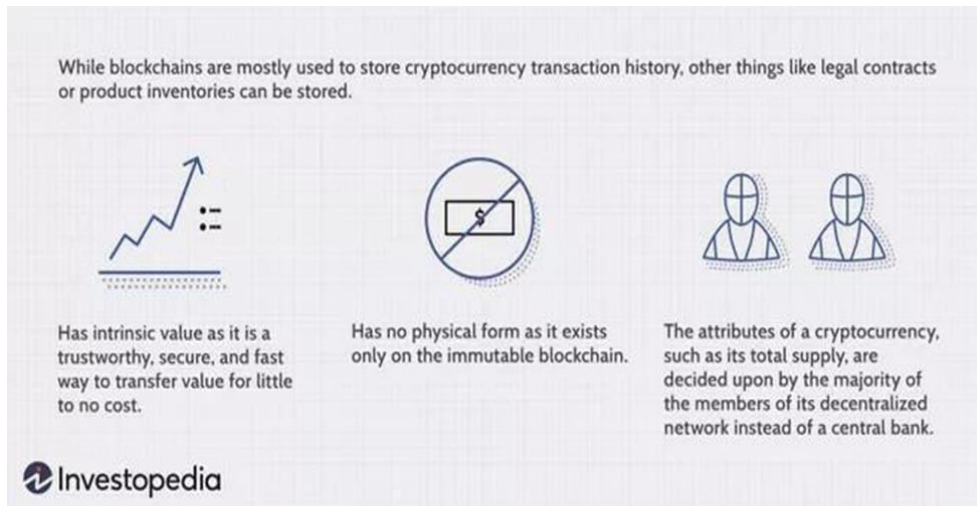


Fig 2: Characteristics of Cryptocurrency

IV. RESULTS AND DISCUSSION

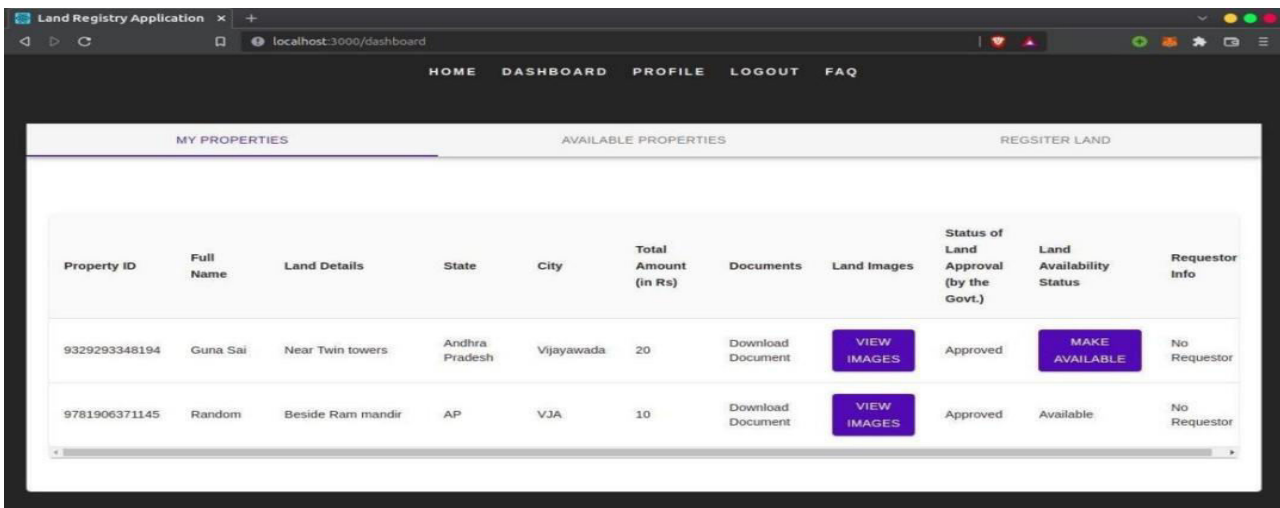


Fig3:Dashboard



We used Ganache and Metamask for testing our Dapp. Ganache (previously TestRPC) is a personal Ethereum blockchain that allows developers to deploy contracts, develop applications, and run tests. It runs entirely locally and emulates a full Ethereum client while being significantly faster, making it ideal for testing and development. Ganache (GUI) and Ganache-CL are the two flavors available.

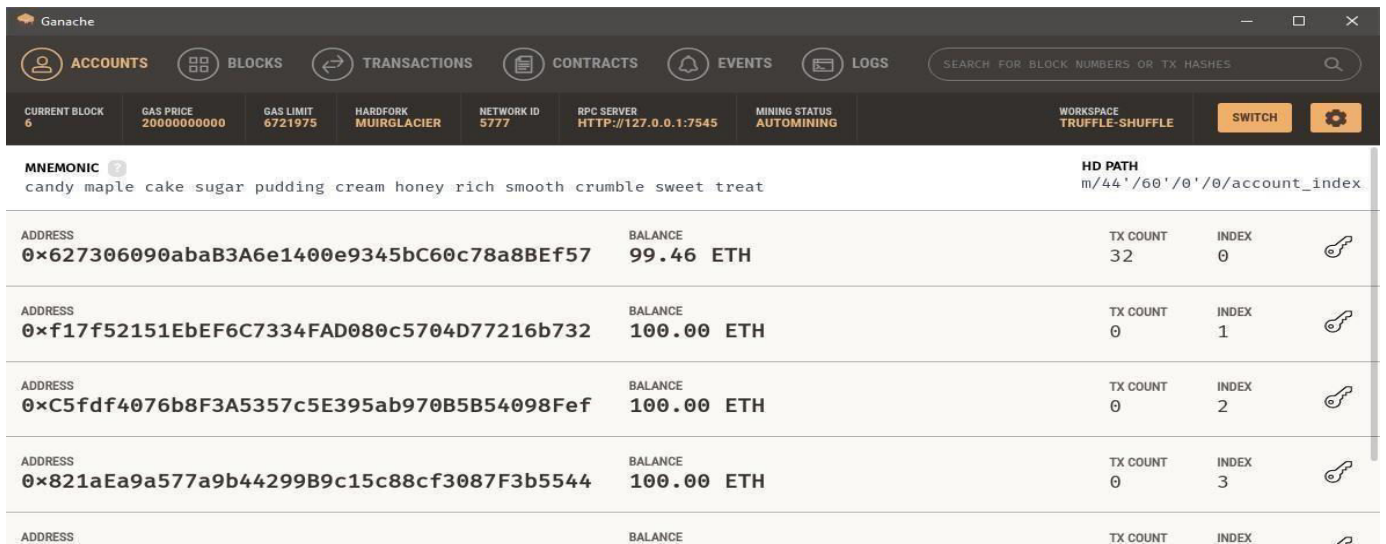


Fig4:Ganache Homepage

MetaMask — MetaMask is a Chrome extension and Ethereum light client that allows users to interact with the blockchain without having to download the entire blockchain. To put it another way, it lets you use a regular Chrome browser to interact with dApps.

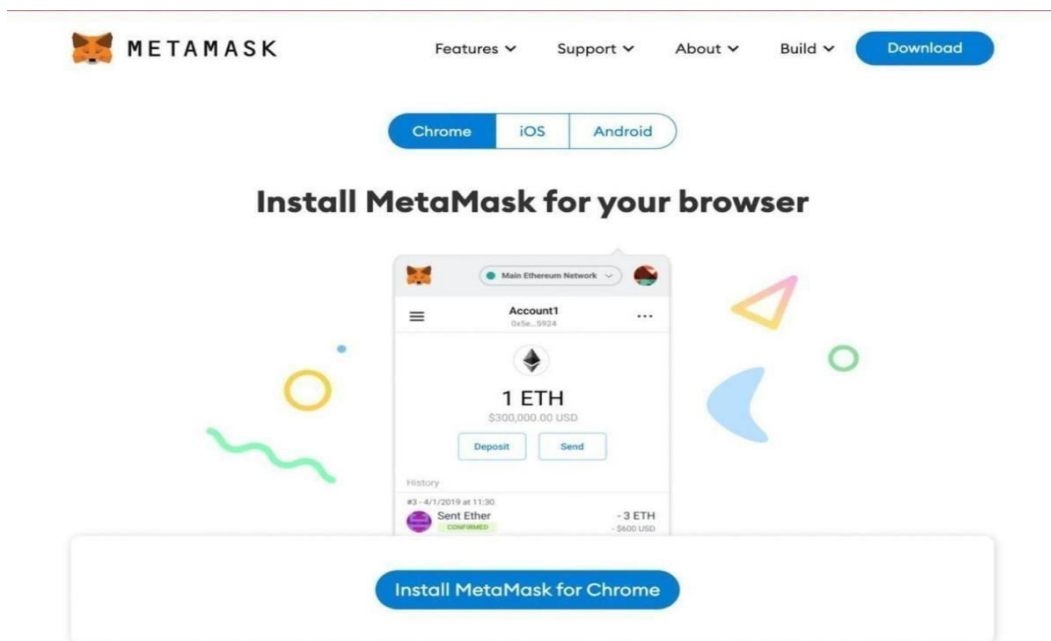


Fig5:Metamask Homepage

V. CONCLUSION

To provide a conceptual basis for blockchain-based land register systems, the paper in question provides a link. This framework was created following a survey of different frameworks, as well as some of the more aggressive tactics and concepts applied in these frameworks. The mapping of the scenarios helped us classify the primary components, which has been helpful in the development of our framework.

Blockchain technology and a land registry could transform governance. Based on the essential concepts used in both classical and new record-keeping systems, we designed a framework for the necessary components. As is the case now, the origins of land record storage are centralised. Since this centralised storage can be hacked, forgery and theft are all possible, we implemented totally decentralised blockchain-based solutions in our framework. We've also emphasised the importance of privacy in this discussion. Some of the framework's nodes are necessary for the system's decentralised nature. This system is only accessible to those who have been granted access, such as a block generator or a government official or police.

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