

# Blockchain and Smart Contract for Land Registration using Ethereum Network

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**Abstract---**In India traditional land registration system, there is a middleman (broker) who creates communication among the buyer and seller, for example. If a person wants to purchase or sell a home, they should contact a broker. Will prepare and assemble all tangible papers that are required in the case of contracts as an evidence of ownership. Brokers will make certain that the land/property is registered government office with all of the necessary qualifications. After that, the entire transaction was recorded in a ledger. And there is a purchase among the two parties. In this circumstance, there is a risk of tampering with the data. Anyone with particular powers has access to the documents. Change the papers easily, putting this solid structure in proof of ownership. We propose a blockchain-based method for safe property storage papers. When a land is purchased by a corporation in our system, the government body will give the funds. Person in possession of a hard copy of the property paperwork as well as our the documents will be stored in the Inter Planetary File System. (IPFS) is a distributed ledger. The IPFS is a file the document's hash will be generated by the network. This is a hash will be kept on the Ethereum blockchain in a safe manner after meeting the smart contract's requirements the smart contracts will check and validate the data. Documents obtained from government officials this will be beneficial. Develop a decentralised, tamper-resistant ledger we can quickly recover the data that has been saved.

## I. INTRODUCTION

The real estate sector is one of the most profitable industries in the world. The real estate business is the process of selling and buying the assets. It is impossible to know when the first real estate transaction took place. So many new technologies have appeared to make the real estate business in advance throughout the year. Nowadays the real estate business is described as inefficient due to its paper based and manual approach and there are several intermediaries are included that increases both transaction costs and the duration of real estate transactions. Further it also increases the workload of manual review and verification of financial and legal documents which can be modified. These centralized paper based system can be crashed by third parties. Blockchain is a distributed technology which provides authentication, security, integrity and make the process faster. The blockchain

technology support digital cryptocurrency to make the payment process more secure. By the concept of Smart contracts, the work be done and be audited automatically without the presence of middleman. To block this vacuum, we lead a far reaching study on the blockchain technology. Specifically, this document provides the taxonomy of the block chain, initiates typical blockchain consensus algorithms and evaluates blockchain apps and discusses technical difficulties in addition to latest developments in addressing problems. A Smart contracts is simply a piece of code which is considered as a law and two parties in a transaction agreed on its content.

## II. LITERATURE SURVEY

The authors of [1] suggest a blockchain-based system for storing property paperwork in a secure manner. When a person buys land in our system, the government authority gives the purchaser a tangible copy of the property papers, which our system then stores in the Inter Planetary File System (IPFS), a decentralised database. The documents from the government authorities will be validated and verified via smart contracts. This will result in a decentralised, tamper-proof ledger from which we can simply extract the data. The author [2] propose a device in which we use a clever agreement to deal with the belongings and transactions of the majority of the contributors, which is extremely time consuming, less stable, and unsynchronized, and in which sports such as corruption and fraudulence are likely related throughout the execution of the specified process. We propose a blockchain-primarily based totally land registration device that offers a transparent, secure, and decentralised approach for execution of transactions among contributors using the hyperledger idea, based on a combination of inspection and evaluation of the vintage traditional method and considering that Blockchain has improved transparency and integrity upkeep in conjunction with the portability factor. The authors in [3] Proposes The device that we're looking to put into effect is primarily based totally on Ethereum Blockchain in order to shop all of the transactions made in the course of the manner of land possession switch. Using the idea of clever contracts of blockchain era we are

able to triggers diverse activities like get right of entry to of land files to a land inspectorand fund switch occasion from purchaser to vendor after a hit verification of the land possession switch. This device makes the mannerof land registration resilient and reduces the instances of fraud with inside the manner. Using the device, validation of the lands is likewise feasible as immutable transactions are being saved with inside the public ledger.

III. PROPOSED SYSTEM

In this we proposed land document registration system based on ethereum and IPFS in this paper. This method ensures that user papers kept in the IPFS garage are secure.We expand a information garage software to illustrate the process.Users who need to shop personal information on IPFS this device can offer introduced protection on their land records. We are the usage of blockchain to be able to growth the believe among consumer and IPFS cloud.the garage utility records consumer actions such as add, delete, and edit for consumer-specific files. These log files are saved on the IPFS network, which also provides the Hash. These hashes of provenance statistics are subsequently preserved as a transaction in Ethereum blockchain networks. If an attempt is made to change a provenance statistics record, we also validate the mechanism .There could be an admin section on the land registry device. He will use the gadgetto log in by providing the necessary credentials. 12 The PropertyId will be entered by the administrator, and it will be searched in the database. All of the database’s matched entries might be shown as URLs inside the browser. As a result, we may obtain a listof all of the belongings possessed by utilizing the owner. This gadget will solve the problems listed above, such as single point of failure and centralized access. As a result, fraudsters may be prevented from using this gadget.

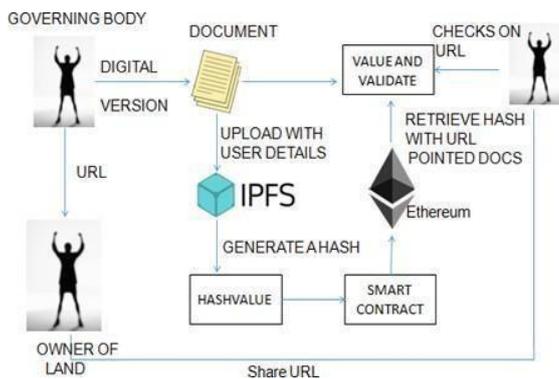


Figure 1:Proposed system Design

A) Module description

We have used IPFS as a garage utility in which person can upload, delete and down load files. By person operation, metadata receives generated that is saved in IPFS and Blockchain. The provenance auditor will affirm the person’s request of validating the file. The Provenance auditor will take a look at the hash of metadata saved in

IPFSand Blockchain. If each suits then it’s going to deliver an output that no person has tampered the data.

1.LAND REGISTRY WEB PORTAL:

land registration system where user can loginusing credentials and search for the documents in the database and also they can registerhere for purchasing new land hence they can get the list of all the property owned bythe owner.

2. LAND REGISTRY DETAILS :

web portal for land registration system where user can loginusing credentials and search for the documents in the database and also they can register here for purchasing new land hence they can get the list of all the property owned bythe owner.

3.STORE HASH OF METADATA:

Retrieving the hash from Metadata and ipfs and storing inthe ethereum blockchain.

4.DEPLOYMENT:

performing the user operations such as send hash and get hash functions and deploying it using smart contract and storing hash values in the ethereum block chain.

5.VALIDATION:

To validate the integrity of these data, we describe a blockchain-based hash valida-tion method. The method assumes that the actual data is stored separately from the blockchain, and then allows a data identifier and a hash of these data to be submitted to the blockchain. the transaction hash from the ethereum and the hash provided by IPFS are compared to validate the genuineness of the documents.

6. VALIDATING OF DIGITALIZED RECORDS:

the transaction hash from the ethereum and the hashprovided by IPFS are compared to validate the genuineness of the documents.

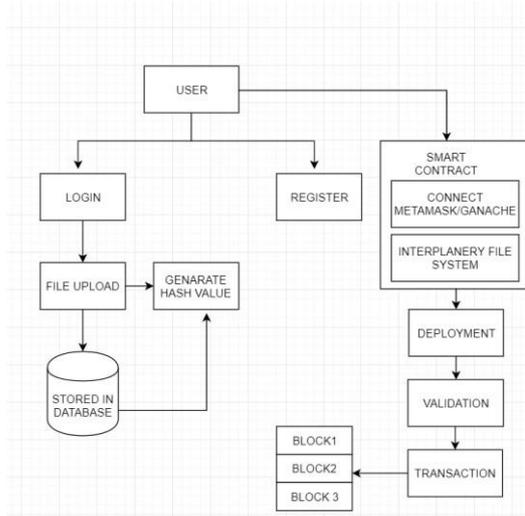


Figure 2: Architecture diagram

**B) Setting up ether wallet for executing smart contracts in Ethereum blockchain network**

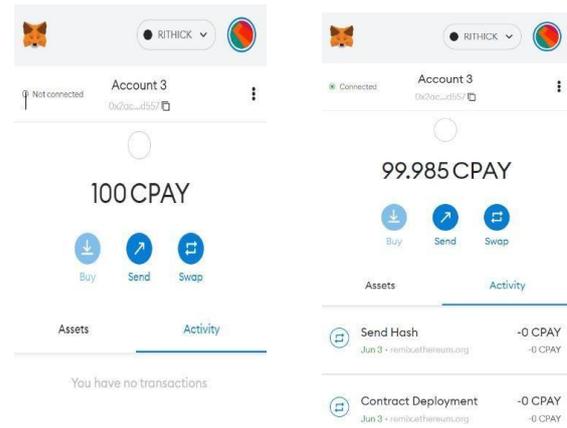
In this, the account in metamask (i.e Ether wallet) will be created. Initially the wallet will contain 0 ethers. In order to execute ether transactions, ethers will be needed. For testing purpose, there are test networks like Rinkeby Test Network, Ropsten Test Network. Ether faucets can be used to get free ethers for testing purpose. Smart contracts can be written using many languages. Here, Solidity language is used. These contracts are compiled and deployed using Remix IDE which is an online compiler for solidity codes. Injected Web3 Environment are selected while compiling to get the Application Binary Interface (ABI) codes which is required for connecting our web app with Ethereum network using web3.js.

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.5.3;
contract IPFS
{
    string ipfsHash;
    function sendHash(string memory x) public
    {
        ipfsHash = x;
    }

    function getHash()
    public view returns (string memory)
    {
        return ipfsHash;
    }
}
```

**C) Creating blocks using smart contracts**

The business logic like rules and regulations provided by government to follow during the land registrations and implemented in the smart contract. These contracts will carry out the ether transactions. When the transaction is successfully carried out, it means a block is created successfully. Depicts the before and after images of the ether wallet. Here, some ethers are reduced from the user’s wallet for the transaction.



Before Transaction                      After Transaction

**Figure 3:Ether in metamask Wallet during transaction**

**D) STEPS:**

- 1) Install MetaMask
- 2) Go to <https://metamask.io/> and install the browser plugin.
- 3) Setup a password and open the wallet. Click on CREATE ACCOUNT to create a new wallet account
- 4) open Ganache. choose the ether account and click on private key to Copy the Address and paste in on metamask to import the account.
- 5) Go to <https://faucet.ropsten.io/> to get free test ether to the address. Check your account on metamask and verify the balance.
- 6) Repeat steps 3 and 4 to create more accounts.
- 7) Deploying contract
- 8) Go to <http://remix.ethereum.org/> and upload your contract file (reg.sol)and IPFS file to deploy the contract.

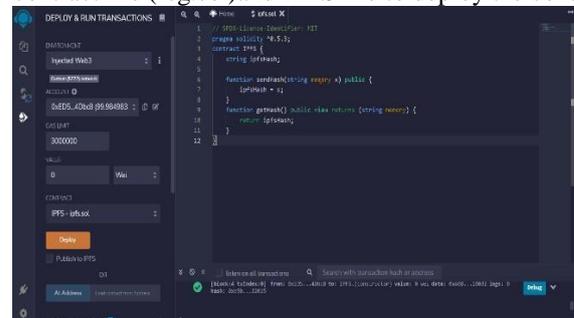


Figure 4:Deployment

9)Transaction will be done and blocks will be created in Ganache.In metamask list of transaction will be generated.

## RESULT AND DISCUSSION

In this section we are discussing the results obtained. From performance evaluation on land registry. For various scenarios Ethereum is a transnational, open-supply architecture that serves as a running device capable of intelligent agreement and allowing the development of decentralized applications (DApps).

Ethereum miners strive to acquire Ethers, a type of crypto asset used to fuel the network. These Ethers are used to pay for network transactions and offerings. A brilliant agreement is at the heart of ethereum. The Solidity programming language is used to create smart contracts. As a result, we no longer wish to purchase any. Friends can use the `eth.getBalance` command to check the balance within the account. The peers are given the ability to use of `admin.nodeinfo.enode` command. To see the whole peer's advertisement, `min.peers` is used. [14] We have done overall performance reviews at the Ethereum testnet. One is Ropsten, which makes use of Proof-of-Work (POW), and the opposite one is Rinkeby, which use Proof-of-Authority (POA)., we proceeded with assessment on Ropsten, which makes use of POW like Ethereum mainnet, due to the fact we intention to degree overall performance in near-actual environments for real use cases. To carry out overall performance assessment at the Ethereum testnet, it's far important to hyperlink the testnet with the clever contracts additionally want to create an account of the testnet to installation and execute the clever contracts. We deal with this thru Infura and MetaMask Infura gives an API to facilitate get admission 46 to to Ethereum networks. Creating a undertaking thru Infura gives an endpoint that permits get admission to to the Ethereum mainnet and Ethereum testnets the usage of the HTTP approach and the Web Socket approach. Encryption functions which include JSON Web Token (JWT) also are furnished through Infura.

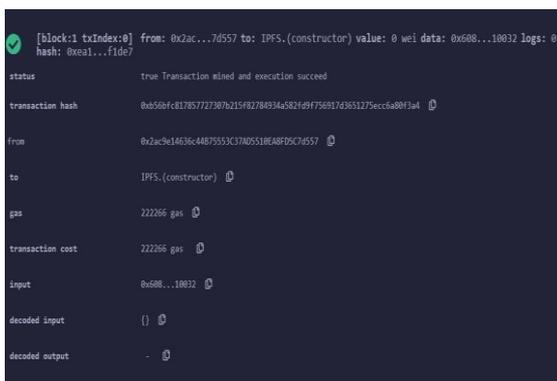


Figure 5: Transaction

Generated endpoints permit JSON-RPC requests to be dispatched to the Ethereum community or web3.js. MetaMask is a pocket which could manipulate Ethereum crypto currency, making it less complicated to manipulate Ethereum non-public wallets. MetaMask permits customers to run Ethereum DApp immediately

with out going for walks the whole Ethereum node. MetaMask is to be had at the Ethereum. we look at the IPFS read latency findings as a function of file size. Conclusion. Because big read requests require the local node to read more blocks, read latency increases with request size.

IPFS is examined. Results For distributed storage, we use IPFS in our system. IPFS is used to save the log records. This procedure's success is crucial in the design process. As a result, we look at the IPFS read latency findings as a function of file size. The read request is a result of the local node's need to read large read requests.

## CONCLUSION AND FUTURESCOPE OF THE WORK

We discussed the design and execution of a Land register administration system based on Blockchain. Initially, we upload the files to the IPFS cloud and save their hashes in Ethereum smart contracts. for land record, IPFS sends the Hash of the record and stores it in Ethereum. The hashed input from transaction hash and the hash provided by IPFS are compared to authenticate the authenticity of a document. As a result, the validation status is generated. We also performed a scalability and performance analysis of the suggested system based on several situations .

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