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ENHANCING SECURE TRANSFER AND MANAGEMENT OF PROPERTY OWNERSHIP WITH CRYPTO SYSTEM INBLOCKCHAIN

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Abstract: The traditional real estate industry faces significant challenges, including fraud, lack of transparency, and inefficiency. In this report explores the Decentralized Real Estate project, which leverages blockchain technology to address these issues and create a secure and transparent platform for real estate transactions. The lack of transparency hinders informed decision-makingfor buyers and sellers, while inefficiencies, such as lengthy processing times andmultiple intermediaries, contribute to delays and increased costs. This platform eliminates intermediaries, enabling direct interactions between buyers and sellers in the real estate industry. Smart contracts automate and enforce agreements, streamlining the transaction process and reducing costs. The decentralized nature of the network ensures data integrity and accessibility, without the need for a central authority. By leveraging blockchain technology, this innovative solution revolutionizes the traditional real estate landscape, providing a secure and transparent platform for efficient transactions. Features like fractional ownership and crowdfunding promote liquidity and democratize real estate investment opportunities. This innovative approach fosters increased transparency, enhanced security, improved efficiency, and broader accessibility in real estate transactions. By examining the benefits and implications of this solution, this report provides insights into the potential transformation of the real estate industry toward a more secure, efficient, and inclusive future.

Keywords: Blockchain; Smart contract; security; transparency; real estate;

1.1 INTRODUCTION

Decentralized Real Estate using blockchain is a revolutionary approach that aims to transform the traditional real estate industry by leveraging the benefits of blockchain technology. Blockchain-based real estate systems are characterized by enhanced transparency, immutability, and security, which is expected to mitigate many of the challenges currently faced by the real estate industry, such as fraud, inefficiency, and lack of transparency. The use of smart contracts, which are self-executing and self-enforcing, enables the automation of various real estate processes, including property listings, purchase agreements, and title transfers.

Moreover, the decentralized nature of blockchain eliminates the need for intermediaries, such as banks, lawyers, and brokers, thus reducing transaction costs and increasing accessibility to the market. The integration of blockchain in the real estate industry is expected to enable faster, more secure, and more transparent transactions, leading to increased efficiency and trust in the market. This paper provides an overview of the current state of decentralized real estate using blockchain, as well as its potential benefits and challenges. This also explores various use cases and discusses future developments in this rapidly evolving field.

Stake (PoS) consensus mechanism into real estate escrow contracts, aiming to enhance transaction efficiency, security, and trust in the real estate industry.

To create a decentralized and secure platform for facilitating transactions involving the transfer of assets, specifically in the context of real estate or property ownership. To design and develop a secure and transparent land registration system using blockchain technology. To address the challenges faced by existing land registration systems, such as disputes and fraudulent activities.

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1.2 REAL ESTATE MARKET AND ITS CHALLENGE

The real estate market is a highly lucrative and dynamic market, but it is also fraught with challenges such as high transaction costs, lack of transparency, fraudulent activities, and inefficient processes. These challenges often lead to mistrust among stakeholders and hinder the growth of the market.

1.3 BLOCKCHAIN TECHNOLOGY

Blockchain technology is a distributed ledger technology that allowsfor secure and transparent transactions without the need for intermediaries. Its decentralized nature and immutable record-keeping capabilities make it an ideal solution for various industries, including real estate.

1.4 SMART CONTRACTS

Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into code. They enable the automation of various processes, including property transfers, rentalagreements, and mortgage contracts.

1.5 TOKENIZATION

Tokenization involves converting real estate assets into digital tokenson a blockchain network. These tokens can then be easily traded, providing increased liquidity and accessibility to the real estate market.

2.1 SMART CONTRACT APPLICATION FOR MANAGING LAND ADMINISTRATION SYSTEM TRANSACTIONS.

Investments in real estate (RE) are larger globally than those in the stock market. Despite this, given to liquidity and global availability, there are substantially fewer RE investors. For owners, investors, and tenants, the current structure seldom meets their needs. This essay aims to demonstrate the potential advantages of blockchain technology in the real estate sector. The investigation has thus far produced the following findings: Blockchain and smart contracts can help RE with its conventional issues and offer far more practical resources for a game-theoretic stable-priced market [1].

2.2 LAND REGISTRY USING BLOCKCHAIN - A SURVEY OF EXISTING SYSTEMS AND PROPOSING A FEASIBLE SOLUTION

This study examines two methods for carrying out real estate transactions: the South African example and a global use of blockchain technology. Two conceptual models using Business Process Modelling and Notation are given. In order to give sufficient information on the real estate transactions, documents were reviewed. The findings show that the manual, paper-based document, and significantly dependent third party nature of the South African real estate transaction process, which leads to multiple bottlenecks, makes it inefficient. The study finds that blockchain-based transactions are more effective and require fewer intermediaries and manual procedures [2].

2.3 THE REAL ESTATE TRANSACTION TRACE SYSTEM MODEL BASED ON ETHEREUM BLOCKCHAIN PLATFORM.

A hard copy of the property papers will be given to the buyer when they purchase land under this system, and the system will keep them in the decentralised Inter Planetary File System (IPFS) database. The IPFS network will generate the document's hash. This hash will be safely stored in the Ethereum blockchain after the smart contracts' requirements are satisfied. The smart contracts will evaluate and verify the official documents from the government. We shall be able to quickly access the stored data from this decentralised, impenetrable ledger.[**3**]

2.4 BLOCKCHAIN TO PREVENT FRAUDULENT ACTIVITIES: BUYING AND SELLING PROPERTY USING BLOCKCHAIN

A smart contract is used in this suggested system to register lands on the Blockchain network. Efficiency, openness, dependability, and integrity for various entities and processes involved in purchasing and selling real estate are just a few advantages that the suggested study might offer to stakeholders.

To ensure that the record is not tampered with, the framework essentially offers services that provide a thorough history and unaltered information on a property. Traditional real estate transaction apps can extract real-time records of the land, such as its dimensions, location, and price, thanks to Restful's external link, which it supplies. The suggested mechanism will ultimately ensure that real estate transactions made online are trustworthy. [**4**]

2.5 AN EFFICIENT CIPHERTEXT-POLICY ATTRIBUTE-BASED ENCRYPTION SCHEME SUPPORTING COLLABORATIVE DECRYPTION WITH BLOCKCHAIN

This article describes a blockchain-based real estate management system that will offer a transparent, secure, and effective real estate management system. All departments involved in real estate management will use this system. All transactions will be stored on a distributed permission blockchain, which is highly automated, secure, and resistant to hacking. The system will be decentralized for data storage yet centralized for connecting all departments. It is a workable fix for the issue of real estate management.[**5**]

2.6 BLOCKCHAIN-BASED REAL ESTATE MARKET: ONE METHOD FOR APPLYING BLOCKCHAIN TECHNOLOGYIN THE COMMERCIAL REAL ESTATE MARKET

VO The distributed ledger, smart contracts, and Blockchain network architecture were all developed by Khoa Tan. The ability to digitize assets on the Blockchain, store a decentralized transaction history, enable encryption, and facilitate transactions between sellers and buyers are all made possible by this technique. Additionally, this system approach can limit data explosion, carry out several transactions at once, and shield private information from prying eyes. The researchers built a model for this system based on the Ethereum Blockchain technology. They have used experimental transactions to show the effectiveness of the RETT system model and its practical application. This approach strengthens mutual confidence, reduces costs, removes intermediaries, and improves transparency in real estate transactions.[**6**]

2.8 BLOCKCHAIN IN REAL ESTATE: RECENT DEVELOPMENTS AND EMPIRICAL APPLICATIONS.

The global real estate market has been rebuilding for more than ten years in response to fresh circumstances. Network users were able to find the information they needed as soon as possible because to widespread digitalization and instant access to the Internet. The market is seeking to implement all new technologies in order to stay relevant and competitive. The adoption of blockchain technology eliminates a lot of the third-party issues that make real estate and cadastre work impossible or difficult.[**7**]

2.9 DECENTRALIZED LEDGER FOR LAND AND PROPERTYTRANSACTIONS IN SRI LANKA ACRESENSE

The suggested solution involves a decentralised ledger that records land and property transactions on top of blockchain technology. All new transaction entries will have their legitimacy checked by smart contracts. After the necessary consensus method has been carried out, the transaction records will be kept in blocks that are cryptographically protected. The integrity of the data was therefore protected. Additionally, investors and land buyers can learn about current market trends and forecasts prior to investing in or acquiring land. Additionally, the suggested system uses a geographical information system to enable users to examine desired property parcels and land information graphically without physically visiting the actual area. [8]

2.10 A Secured E-Governance System Using Blockchain Techniques

In this, the author proposed a system as an advantage to One of the most crucial applications of electronic government systems is the land register in Blockchain. If the owner has the legal right to sell the property or transfer ownership to others, they can do so by checking their rights. The buyer and seller may simply speak with one another because they are both users of the blockchain channel, which connects people through a single platform. Verifying real estate and land records becomes very easy and available to everyone.

This chapter discusses an overview of the Language specification, system architecture, including the functional connections between entities, the Proof of Stake (PoS) consensus mechanism, data flow diagram, use-case diagram, and sequence diagram.

3.1 LANGUAGE SPECIFICATION

3.1.1 Solidity

Solidity is a high-level programming language that is used forcreating smart contracts on the Ethereum blockchain. It is an object-oriented language, which is designed to provide safety, security, and reliability to the code. Solidity programming language is similar to JavaScript and has a syntax that is easy to learn for developers with experience in programming. However, creating and testing Ethereum applications requires more than just knowledge of Solidity. Several tools and frameworks are available for development and testing Ethereum applications, which can help developers to build better and more reliable applications. Two such tools are Hardhat and Chai, and a framework is Mocha.

3.1.1 Hardhat

Hardhat is a development environment for building and testing Ethereum applications. It includes a task runner, a local blockchain network, and a suite of plugins that make it easy for developers to create and test Ethereum applications. The task runner allows developers to automate repetitive tasks such as compiling code, deploying contracts, and running tests. The local blockchain network provides a local Ethereum environment for developers to test their applications without the need for a real Ethereum network. Hardhat has several plugins, including the Solidity compiler, which compiles Solidity code into bytecode that can be executed on the Ethereum network. It also has plugins for deploying contracts, testing, and debugging. The testing plugin includes support for testing smart contracts using Mocha and Chai, which makes it easyfor developers to write and run tests for their applications.

3.2 SYSTEM ARCHITECTURE

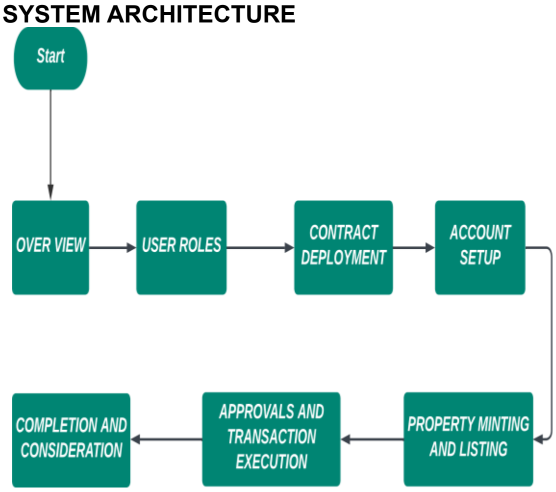

Figure 3.1: Architecture of Proposed System

All the entities that are now incorporated into the system are described in this image in a clear and plain manner. The figure demonstrates how various activities and decisions are connected to one another. You could say that the entire procedure and the way it was handled paint an image. The relationships between various entities' functional roles are depicted in the image below. Figure 3.1 depicts the architecture of the suggested system.

3. 1 PROOF OF STAKE (POS) CONSENSUS MECHANISM

Blockchains use the Proof of Stake (PoS) consensus process to establish distributed consensus. Validators expressly stake money into an Ethereum smart contract in the form of ETH. Validators are chosen to create new blocks in proportion to the amount of cryptocurrency they have staked. This is different from proof-of-work where miners compete to solve complex mathematical problems to create new blocks. Proof of stake introduces scalability to the Ethereum blockchain. Currently, Ethereum processes 15 transactions per second, which in the grand scheme of financial transactionsis pretty slow. It is shown in the Figure 3.2 and figure 3.3 shows the Use-case diagram.

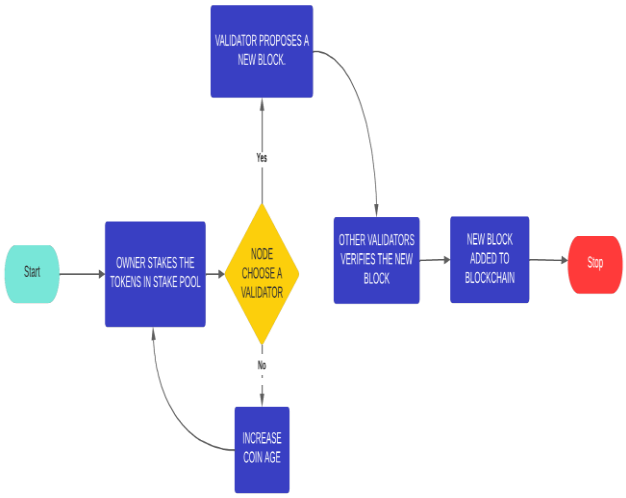

Figure 3.2: Proof of Stake

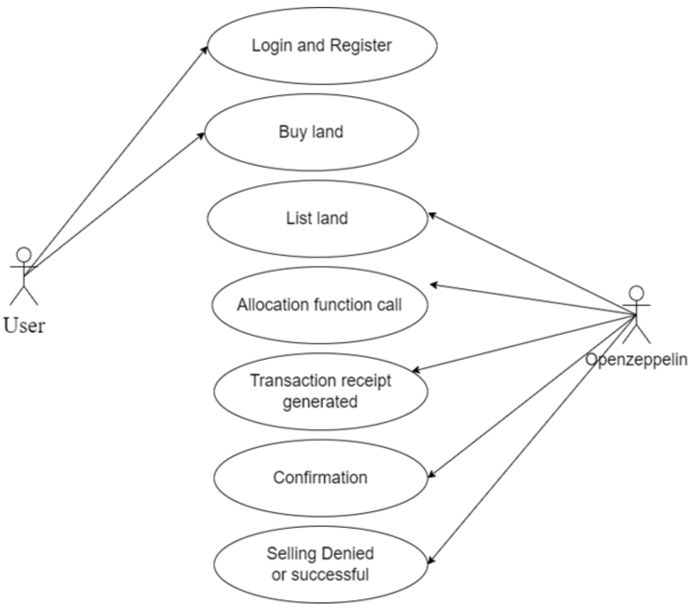

Figure 3.3: Use-Case Diagram

3.2 SEQUENCE DIAGRAM

These are another type of interaction-based diagram used to displaythe workings of the system. They record the conditions under which objects andprocesses cooperate.This is shown in the figure 3.6

4.1 MODULE 1: FRONT-END

The frontend and the deployed contract are connected using the web3.js library and the deployed contract's ABI address. The App.js file contains all of the front-end's source code. The Metamask wallet's presence in the user's browser is first verified. If the user's wallet does not contain Metamask, the user is requested to install a wallet before being asked to connect to the wallet. The landing page where the user may fill out the form to register their property and deposit the data on the tamper-proof, immutable Blockchain is displayed once the user signs the transaction.

4.1.1 React.js

React.js is a JavaScript library widely used for building user interfaces in web applications. Its component-based architecture enables developers to create reusable UI components, promoting code reusability and scalability. Withthe use of a virtual DOM, React.js efficiently updates and renders only the necessary components, enhancing performance and responsiveness. Its declarative syntax allows developers to describe the desired UI based on the application's state, making code more understandable and maintainable. The one-way data flow ensures a predictable state management, facilitating debugging 0and testing. React.js benefits from a large ecosystem of libraries and community support, providing developers with a wide range of tools and resources to enhance their productivity. Moreover, React.js is versatile, enabling developersto build both web and mobile applications using frameworks like React Native.In summary, React.js empowers developers to build dynamic, interactive, and cross-platform user interfaces with efficiency and maintainability.

4.1.2 Next.js

Next.js is a powerful framework that extends the capabilities of React.js by providing tools for creating universal applications. It enables server-side rendering (SSR) or static pre-rendering of React.js apps, offering improved performance and search engine optimization (SEO) benefits. With Next.js, developers can leverage popular tools like Webpack, Babel, and Uglify to optimize and bundle their application code. The simplicity of the Next.js interface allows developers to focus on development tasks effortlessly. Using commands like 'next' for development, 'next build' for production-ready builds,'next start' for serving the application, and 'next export' for pre-rendering to static files, Next.js streamlines the development workflow. By combining the power of React.js with server-side rendering and static pre-rendering, Next.js empowers developers to build high-performance, SEO-friendly web applications efficiently.

4.1.3 Metamask

Websites and the Ethereum blockchain are connected by Metamask. The blockchain's smart contracts check to see if a network node may access that data or not. When a neighbourhood blockchain network is created, Metamask wallet can take care of the nodes. Metamask is a cryptocurrency wallet that can be added to Google Chrome. It is a way to communicate with the Ethereum blockchain. Metamask is used to store Ethereum accounts. Itis safe and easy to use, and can also be used to deploy to the main Ethereum networks.

4.1.4 Libraries And Tools Used

4.1.4.1 Contract ABI

The standard way to interact with contracts in the Ethereum ecosystem, both from outside the blockchain and between contracts, is throughthe Contract Application Binary Interface (ABI). Based on the type of data, as described in this specification, the data is encoded. The encoding does not describe itself, so it needs a schema to be decoded. We assume that a contract'sinterface functions are strongly typed, known at the time of compilation, and static. We assume that all contracts will be able to compile with the interface definitions of any other contracts they call. This specification doesn't talk aboutcontracts whose interfaces are dynamic or whose details are only known at runtime.

4.1.4.1 Ether.js Library

A full and lightweight toolkit for interfacing with the Ethereum Blockchain and its ecosystem is what the ethers.js library strives to be. Its original intention was to work with ethers.io, but it has now evolved into a more all-purpose library.

4.2 MODULE 2: CONTRACTS

4.2.1 Escrow smart contract

Algorithm 4.1 Escrow Smart Contract

```
Interface: IERC721
State Variables:
- nftAddress: address
- seller: address payable
- inspector: address
- lender: address
- isListed: mapping(uint256 =¿ bool)
- purchasePrice: mapping(uint256 =¿ uint256)
- escrowAmount: mapping(uint256 =¿ uint256)
- buyer: mapping(uint256 =¿ address)
- inspectionPassed: mapping(uint256 =¿ bool)
- approval: mapping(uint256 =¿ mapping(address =¿ bool))
Constructor(_nftAddress, _seller, _inspector, _lender):
 - nftAddress ← _nftAddress
 - seller ← _seller
 - inspector ← _inspector
 - lender ← _lender
 Modifier: ONLYBUYER(_nftID):
- require(msg.sender == buyer[_nftID], "Only buyer can call this method")
- continue
 Modifier: ONLYSELLER():
- require(msg.sender == seller, "Only seller can call this method")
- continue
 Modifier: ONLYINSPECTOR():
- require(msg.sender == inspector, "Only inspector can call this method")
- continue
Function LIST(_nftID, _buyer, _purchasePrice, _escrowAmount):
- Transfer NFT from seller to this contract
- IERC721(nftAddress).transferFrom(msg.sender, address(this), _nftID)
 - isListed[_nftID] ← true
 - purchasePrice[_nftID]← _purchasePrice
 - escrowAmount[_nftID]← _escrowAmount
- buyer[_nftID] buyer
 Function APPROVESALE(_nftID):
 - approval[_nftID][msg.sender] ← true
Function FINALIZESALE(_nftID):
- require(inspectionPassed[_nftID])
- require(approval[_nftID][buyer[_nftID]])
- require(approval[_nftID][seller])
- require(approval[_nftID][lender])
 - require(address(this).balance ≥ purchasePrice[_nftID])
 - isListed[_nftID] ← false
- payable(seller).callvalue: address(this).balance("")
```

The smart contract implemented is an Escrow contract that facilitatestransactions involving the sale of non-fungible tokens (NFTs) on the blockchain.It includes various functionalities to ensure a secure and transparent exchange between the buyer, seller, and other involved parties. The contract allows the seller to list an NFT for sale by specifying the buyer, purchase price, and escrowamount. The buyer can deposit the required earnest amount, and both parties can approve the sale. An inspector can update the inspection status of the NFT,and once the nspection is passed and all parties have approved, the sale canbe finalized. The contract ensures that the purchase price is met, transfers the funds to the seller, and transfers the NFT to the buyer. Additionally, the contractsupports canceling the sale if the inspection fails, refunding the funds to the buyer. The contract keeps track of the listed NFTs, their prices, and the approval status of each party involved. Overall, this smart contract provides a secure andtransparent escrow system for NFT transactions, enhancing trust and reducing the potential for fraudulent activities.

4.1.1 Proof of Stake

Proof of Stake (PoS) is a consensus mechanism used by blockchainsto achieve distributed consensus. PoS relies on the stake, i.e., the amount of tokens that the participants own, to determine who can validate new blocks andhow much voting power they have. PoS is more energy-efficient and scalable than Proof of Work (PoW), which requires a lot of computational power. In this project, PoS could be used to select network validators and assign them voting power based on their stake. Validators are responsible for verifying transactions, creating new blocks, and ensuring the security of the blockchain. By staking their tokens as a guarantee, validators have a financial incentive to act honestly and protect the network. PoS has several benefits, such as reducingthe risk of centralization and enabling faster block confirmation times. It also encourages token holders to actively participate in the network's governance and decision-making processes. The specific implementation details of PoS, such as block creation, consensus algorithms, and incentive mechanisms, may differ depending on the project's needs and the chosen PoS protocol.

Algorithm 4.2 Proof of Stake (PoS)

Input: List of validators V, Block B
Output: Validator selected to create the next block
Function SELECTVALIDATOR(V, B):
- Initialize an empty array P for the validator probabilities
- Initialize a variable T for the total stake
each validator v in V
- Calculate the validator's stake S_v
- Add S_v to T
each validator v in V
- Calculate the probability $P_v = \frac{S_v}{T}$
- Add P_v to P
- Select a random number r between 0 and 1
- Initialize a variable c for the cumulative probability
each validator index i in the range of $|V|$
- Add $P[i]$ to c $r \leq c$ $V[i]$ as the selected validator
Function CREATEBLOCK(V, B):
- Get the selected validator using SELECTVALIDATOR(V, B)
- Create a new block B' with the selected validator as the creator B' as the newly created block

5.1 USER INTERFACE

React is used to develop user interface. Within the real estate project,it is in charge of rendering property details and facilitating user interactions. Theuser interface includes dynamic property information such as images, overview details (bedrooms, bathrooms, square footage), and the property's address. The price of the property is displayed prominently, allowing users to quickly understand the cost in Ethereum (ETH). The user interface adapts based onthe user's role and the current status of the property, showing different buttonsfor buyers, sellers, lenders, and inspectors. Toast notifications provide visual feedback to users when actions such as buying, inspecting, or selling a propertyare successfully completed. The current owner of the property is displayed, with only a portion of their Ethereum account address shown for privacy. The property's description and features are also presented, giving users more information about the property. The user interface is styled and designed to provide a visually appealing and user-friendly experience for interacting with the real estate project. User interface is shown in Figure 5.1

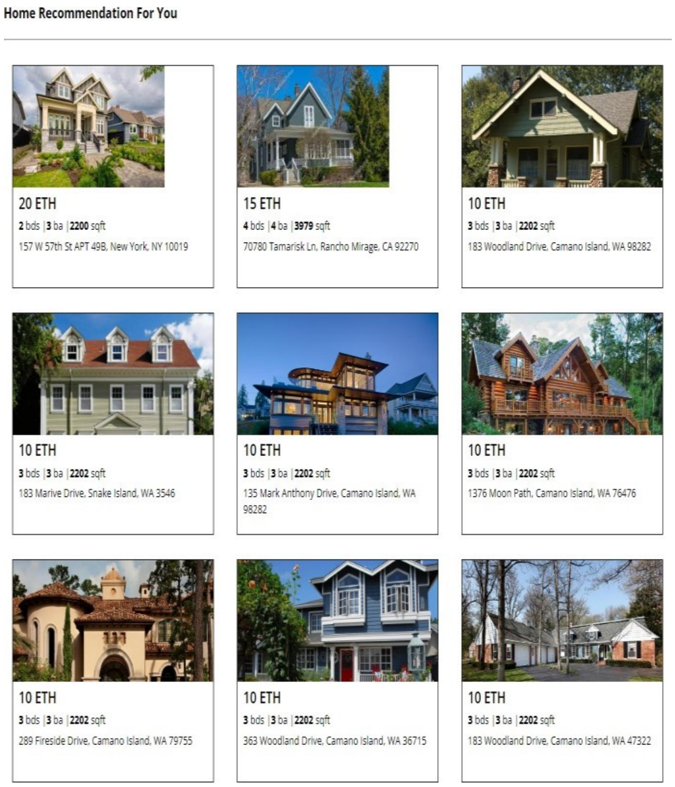

Figure 5.1: User Interface

5.1 BUYER

The following subsections illustrate the state of the property from thebuyer's perspective both before and after a successful sale.

5.1.1 State Before Transaction - Buyer

The following Figure 5.2 represents the state of the property page from buyer's perspective in intial before starting any transactions, where the property button was "Buy".

5.1.2 State After Transaction – Buyer

The following Figure 5.3 represents the state of the property page from buyer's perspective after a successful transaction where the property button has changed to "Sold Out".

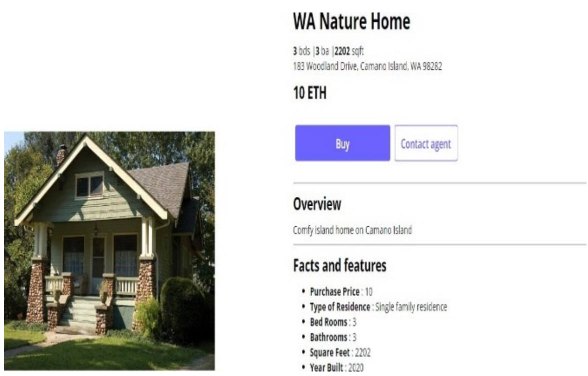

Figure 5.2: State of the Property Before Transaction

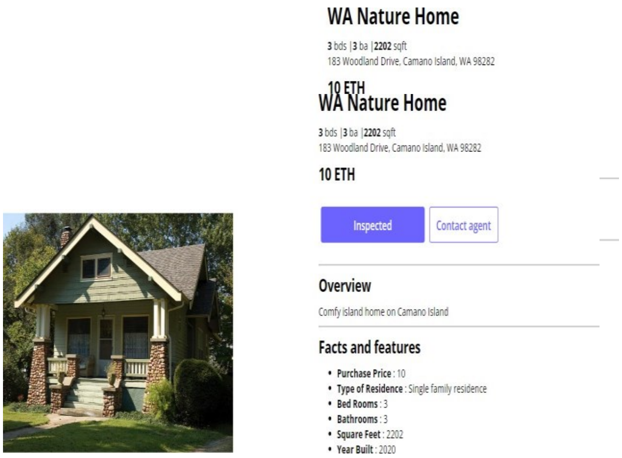

Figure 5.3: State of the Property After Transaction

5.2 INSPECTOR

The following subsections illustrate the state of the property from theInpector's perspective both before and after a successful sale.

5.2.1 State Before Transaction - Inspector

The following Figure 5.4 represents the state of the property page from inspector's perspective in intial before inspection, where the property buttonwas "Inspect".

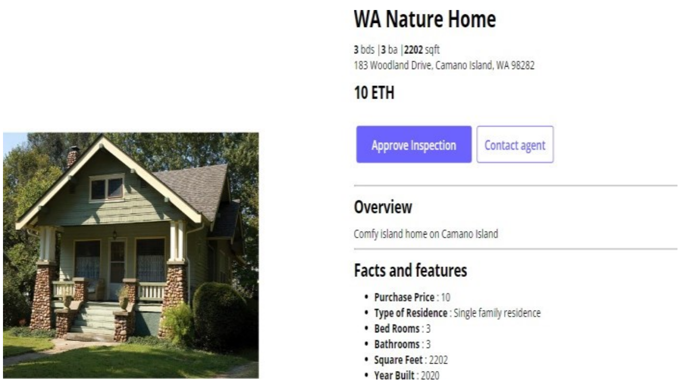

Figure 5.2: State of the Property Before Inspection

5.2.1 State after transaction - Inspector

The following Figure 5.5 represents the state of the property page from buyer's perspective after a successful transaction where the property button has changed to "Sold Out".

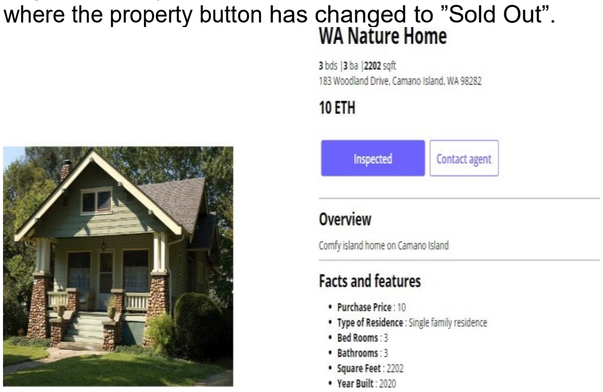

Figure 5.3: State of the Property After Inspection

5.3 SELLER

The following subsections illustrate the state of the property from theseller's perspective both before and after a successful sale.

5.3.1 State Before Transaction - Seller

The following Figure 5.4 represents the state of the property page from seller's perspective in intial before approve and sell, where the property button was "Approve and sell".

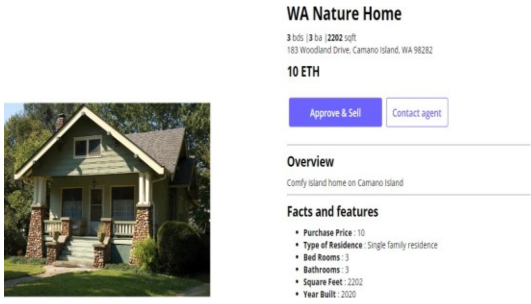

Figure 5.4: State of the Property Before Approval

5.3.1 State After Transaction - Seller

The following Figure 5.5 represents the state of the property page from seller's perspective after a successful transaction where the property button has changed to "Approved".

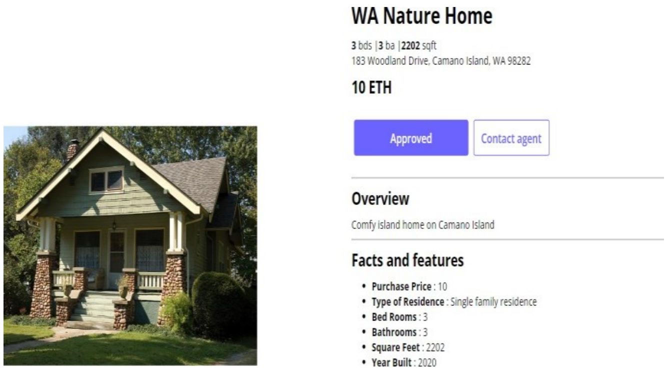

Figure 5.5: State of the Property After Approval

5.4 LENDER

The following subsections illustrate the state of the property from thelender's perspective both before and after a successful transaction.

5.4.1 State Before Transaction - Lender

The following Figure 5.8 represents the state of the property page from lender's perspective in intial before transaction, where the property buttonwas "Aprove and Lend".

5.4.2 State After Transaction - Lender

The following Figure 5.9 represents the state of the property page from lender's perspective after a successful transaction where the property button has changed to "Lended".

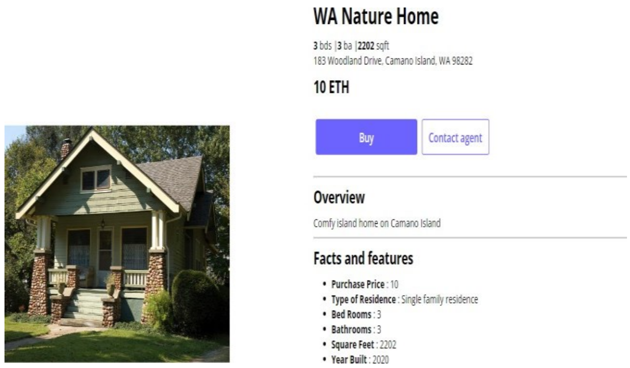

Figure 5.6: State of the Property After Lending transaction

5.5 TRANSACTION

The below blockchain transaction represents the transfer of cryptocurrency from one Ethereum address to another. It signifies a digital exchange, securely recorded on the Ethereum blockchain where ownership and control are transferred.

The sender's address, 0x90F79bf6EB2c4f870365E785982E1f101E93bb906, initiates the transaction, while the receiver's address, 0xe7f1725E7734CE288F8367e1b143E90b3F0512, is the designated destination for the transferred funds or assets. This decentralized transaction ensures transparency, immutability, and trust in the Ethereum network, enabling peer-to-peer transactions without intermediaries.

5.6 TRANSACTION HISTORY OF SPECIFIC ACCOUNT

This visual representation offers a comprehensive view of the dynamicflow of digital asset transfers and smart contract interactions within the Ethereum blockchain. The decentralized nature of transactions becomes apparent as you trace the path of value exchanges across the network. The image showcases key transaction details, including the unique Hash identifier, the sender (From)and recipient (To) addresses, the transferred Value, Gas Limit, Gas Price, and Nonce. By analyzing this information, valuable insights can be gained into the movement of assets and the utilization of computational resources in the Ethereum ecosystem. Explore the intricate web of transactions and immerse yourself in the decentralized world of blockchain technology.

5.6.1 TRANSACTION DETAIL OF SPECIFIC TRANSACTION

Figure 5.13 provides insight on detailed transaction report of a specificaccount. It consists of transaction fee, gas price, ether price, gas limit and usageburnt and txn savings fees.

5.7 CONTRACT DEPLOYMENT TIME

This figure showcases the time taken to deploy the Real Estate and Escrow contracts. The deployment process involves contract compilation, deployment, and initialization. The recorded time represents the efficiency and speed of contract deployment, contributing to the overall system performance. It is shown in Figure 5.7

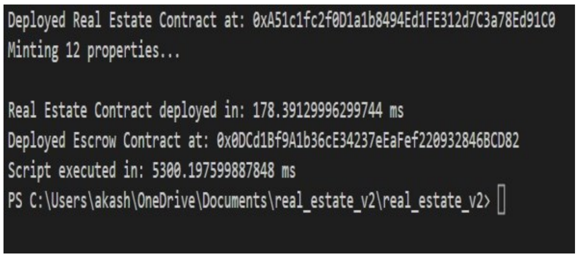

Figure 5.7: Contract Deployment

6. Conclusion

The implementation of a decentralized real estate system using blockchain technology has the potential to revolutionize the real estate industry by providing a secure, transparent, and efficient method of recording and transferring property ownership. The use of smart contracts enables automated and immutable transactions that remove the need for intermediaries, reducing costs and streamlining the buying and selling process. Additionally, blockchain's tamper-proof nature ensures that all information recorded on the ledger is accurate and trustworthy, mitigating the risk of fraud and improving the overall integrity of the system. Despite the promising potential of blockchain technology in the real estate industry, there are still some challenges that need to be addressed, such as regulatory and legal hurdles, standardization of data, and adoption by industry stakeholders. Moreover, the implementation of a decentralized system requires a significant investment of resources and infrastructure, which may deter some companies from adopting the technology. However, as the benefits of blockchain become more apparent and the technology becomes more widely adopted, it is likely that we will see an increase in decentralized real estate systems. The potential for increased transparency, reduced costs, and improved efficiency will drive the industry toward this new way of conducting real estate transactions. Ultimately, the successful implementation of a decentralized real estate system using blockchain technology could transform the industry, making it more accessible, efficient, and secure for all stakeholders involved. The future work for the Decentralized Real Estate project can involve several areas of improvement and expansion. Here are some potential areas to focus on Smart contracts can be further expanded and refined to automate additional aspects of real estate transactions, such as rental agreements, property maintenance, or dispute resolution. Integrating oracles or external data sources can enhance the functionality and reliability of smart contracts.

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