BLOCK CHAIN LAND AND FLAT REGISTRY PLATFORM-REDUCING FRAUDS AND DELAYS

Major project report submitted
in partial fulfillment of the requirement for award of the degree of

Bachelor of Technology
in
Computer Science & Engineering

By

K DAYASAGARAN	(20UECS0395)	**(12056)**
P ARULSIVA	(20UECS0674)	**(17237)**
M RUDHRA KUMAR	(20UECS0546)	**(12071)**

Under the guidance of
Dr. ARUNA, M.Tech., Ph.D.,
ASSOCIATE PROFESSOR

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SCHOOL OF COMPUTING

VEL TECH RANGARAJAN DR. SAGUNTHALA R&D INSTITUTE OF SCIENCE & TECHNOLOGY

(Deemed to be University Estd u/s 3 of UGC Act, 1956)
Accredited by NAAC with A++ Grade
CHENNAI 600 062, TAMILNADU, INDIA

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CERTIFICATE

It is certified that the work contained in the project report titled ”Block chain Land And Flat Registry Platform-Reducing Frauds and Delays” by K DAYASAGARAN (20UECS0395), P ARUL SIVA (20UECS0674), M RUDHRA KUMAR (20UECS0546)” has been carried out under my supervision and that this work has not been submitted elsewhere for a degree.

Signature of Supervisor
Computer Science & Engineering
School of Computing
Vel Tech Rangarajan Dr. Sagunthala R&D
Institute of Science & Technology
May, 2024

Signature of Professor In-charge
Computer Science & Engineering
School of Computing
Vel Tech Rangarajan Dr. Sagunthala R&D
Institute of Science & Technology
May, 2024

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(K DAYASAGARAN)

Date: / /

(P ARUL SIVA)

Date: / /

(M RUDHRA KUMAR)

Date: / /

APPROVAL SHEET

This project report entitled (Block chain Land And Flat Registry Platform-Reducing Frauds and Delays.) by (K DAYASAGARAN) (20UECS0395), (P ARUL SIVA) (20UECS0674), (M RUDHRA KUMAR) (20UECS0546) is approved for the degree of B.Tech in Computer Science & Engineering.

Examiners **Supervisor**

Dr. ARUNA, M.Tech., Ph.D.,
Associate Professor.

Date: / /

Place:

ACKNOWLEDGEMENT

We express our deepest gratitude to our respected **Founder Chancellor and President Col. Prof. Dr. R. RANGARAJAN B.E. (EEE), B.E. (MECH), M.S (AUTO),D.Sc., Foundress President Dr. R. SAGUNTHALA RANGARAJAN M.B.B.S.** Chairperson Managing Trustee and Vice President.

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K DAYASAGARAN (20UECS0395)
P ARUL SIVA (20UECS0674)
M RUDHRA KUMAR (20UECS0546)

ABSTRACT

In the current landscape, incidents of counterfeit land titles, fraudulent land registry activities, and delays in ownership transfer are becoming increasingly common, highlighting the inefficiency of the existing land registry systems in providing security and timely transaction settlements. To address these issues, we present a solution in the form of a blockchain-based land registry system in this article. The key feature and appeal of blockchain technology lie in its transparency and security. With characteristics such as persistence, immutability, and decentralization, blockchain offers a new avenue for enhancing efficiency and reducing costs. It provides a solid framework for digital asset management, online payments, remittance transfers, and importantly, it can help in combating black money laundering. Enterprises adopting blockchain technology can instill consumer trust. In the proposed solution, it introduce a decentralized application. Specifically, it utilize the Advanced Encryption Standard (AES) algorithm for creating and deploying smart contracts on the Ethereum network. These contracts are then interacted with through frontend web pagest. For server-side operations and routing, it employ java. Through our methodology, it ensure that the deployed contracts are encrypted using AES, enhancing the security and privacy of land transactions. The results and analysis indicate that our proposed model is efficient and viable, offering a secure and transparent platform for land registry operations.

Keywords: Blockchain, Transparency, Smart Contracts, Immutable Ledger, Real-Time Transactions, Transactions.

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

AES	Advanced Encryption Standard
API	Application programming interface
CSS	Cascading Style Sheet
HTML	Hyper Text Markup Language
HTTP	Hypertext Transfer Protocol
IDE	Integrated Development Environment
IT	Information Technology
IEC	International Electrotechnical Commission.
ISO	International Organization for Standardization
JSP	Java Server Pages
JS	Java Script
MIS	Management Information System
OTP	One-Time Password
PoW	Proof of Work
PoS	Proof of Stake
RAM	Random Access Memory
REIT	Real Estate Investment Trust
RERA	REAL ESTATE REGULATORY AUTHORITY
SQL	Structure Query Language
URL	Uniform Resource Locator
XOR	Exclusively-OR

TABLE OF CONTENTS

Chapter 1

INTRODUCTION

1.1 Introduction

Block chain is an emerging platform for developing decentralised applications and data storage among the shared parties with all recorded transactions that have been executed through- out the process. Each and every transaction in the public ledger is verified using consensus protocols involving majority of the participants of the system. As the new data is emerging blocks are created and encrypted using hashing algorithms. Thus, the information entered once cannot be modified without consulting a legal administrator. Block chain allows one to create a ledger of events, transactions and data, generated through various IT processes with strong cryptographic guarantees that is distributed and replicated across the network for tamper resistance, immutabilityand verifiability. It is a distributed digital ledger that is open, shared, transparent and highly secured which means all the transactions or records processed are immutable and verifiable.

As the name indicates, block chain allows a block of data to grow as new blocks are appended to it, with each block containing transaction information stored in a specially designed data storage structure. In this system, users would register on the portal and can take up the role of a buyer or seller accordingly. The seller needs to upload all requisite details whereas the buyer can then buy the lands on the portal that are verified by the smart contract. Further users can get deeds digitally which will be uploaded as a new block in the chain. In this way this proposed system does not involve any middleman and all transactions are directly dealt between the buyer and the seller. Transactions will be backed up in all legal servers of all the parties involved in a cryptographic format and the audit ability of transactions will be stronger now that they are associated with timestamps.

1.2 Aim of the Project

The aim of the blockchain land and flat registry platform focused on reducing frauds and delays is multifaceted, encompassing both the enhancement of security

and efficiency within the real estate industry. Firstly, the project aims to establish a secure and immutable ledger system using blockchain technology, thereby significantly reducing the risk of fraudulent activities such as property title fraud, double-selling, or unauthorized alterations to ownership records. By implementing cryptographic techniques and decentralized consensus mechanisms, the platform ensures that every transaction is transparently recorded and tamper-proof, instilling trust among stakeholders and safeguarding the integrity of property transactions.

Secondly, the project aims to streamline the registry process and minimize delays associated with manual paperwork, administrative bottlenecks, and intermediaries. Through the automation of property transactions using smart contracts, the platform facilitates swift and seamless transfers of ownership rights upon fulfillment of predefined conditions, such as payment verification or regulatory compliance. This automation not only accelerates transaction processing but also reduces the dependency on intermediaries, mitigating the potential for human errors and bureaucratic hurdles. Ultimately, the aim of the project is to modernize the land and flat registry process, fostering a more efficient, transparent, and trustworthy ecosystem that benefits all stakeholders involved in real estate transactions.

1.3 Project Domain

The domain of a blockchain-based land and flat registry platform represents a transformative approach to real estate management, aiming to mitigate the prevalent issues of fraud and delays inherent in traditional registry systems. By harnessing the power of blockchain technology, this platform offers a decentralized, tamper-resistant ledger where property transactions can be securely recorded in a transparent and immutable manner. This foundational aspect ensures that once a transaction is documented on the blockchain, it becomes virtually impossible to alter or manipulate, significantly reducing the risk of fraudulent activities such as unauthorized changes to ownership records or the duplication of property titles.

Moreover, the implementation of such a platform streamlines the registry process by digitizing and automating various aspects of property transactions. Through smart contracts, predefined conditions and actions can be encoded into the blockchain, enabling automated execution of agreements upon fulfillment of specified criteria. This

automation not only minimizes the need for intermediaries but also expedites the transfer of property ownership rights, thereby mitigating delays commonly associated with manual paperwork and administrative processes. Ultimately, by enhancing security, efficiency, and transparency, a blockchain-based land and flat registry platform serves as a catalyst for modernizing real estate management practices while fostering trust and reliability within the industry.

1.4 Scope of the Project

The scope of a blockchain-based land and flat registry platform geared towards reducing frauds and delays encompasses various stages and functionalities aimed at digitizing and securing the property transaction process. Initially, the project would involve designing and developing the blockchain infrastructure, including selecting the appropriate blockchain platform, establishing consensus mechanisms, and designing the data structure for storing property records securely. Integration with existing land and flat registry systems or creating new digital interfaces for users would also be within the scope, ensuring seamless adoption and compatibility with established practices.

Furthermore, the implementation of smart contracts to automate key aspects of property transactions would be a pivotal component of the project. This involves defining the conditions and actions governing property transfers, payment settlements, and verification processes, thereby reducing the reliance on manual intervention and minimizing the potential for errors or disputes. Additionally, the scope would encompass features to enhance transparency and accessibility, such as providing public access to the blockchain ledger while ensuring data privacy and security through encryption and access control mechanisms. Overall, the project's scope would entail a comprehensive overhaul of traditional land and flat registry processes, leveraging blockchain technology to instill trust, efficiency, and accountability in real estate transactions while combating frauds and delays.

Chapter 2

LITERATURE REVIEW

[1] A. Litke et al., [2019] explored the potential of blockchain technology in revolutionizing supply chain management. The paper examines the architectural elements and challenges associated with deploying blockchains at a global scale. Through a comprehensive literature review, the authors highlight the benefits of blockchain in enhancing transparency, traceability, and efficiency in supply chains. They address key challenges such as scalability, interoperability, and data privacy, offering insights into overcoming these obstacles. By providing a roadmap for the adoption of blockchain in supply chain management, the paper contributes to the ongoing discourse on leveraging emerging technologies for sustainable logistics solutions.

[2] A. Gervais et al., [2016] delved into the security and performance characteristics of proof-of-work blockchains. They scrutinize the resilience of these blockchains against diverse security threats and assess their scalability and efficiency. Through empirical research and analysis, the authors offer insights into the strengths and limitations of proof-of-work consensus mechanisms. Their findings significantly contribute to understanding the viability of blockchain technology and its potential for broader adoption across various applications.

[3] Black et al., [2014] explored how organizations adapt to market changes through innovative business models and demonstrate the utility of the Balanced Scorecard in measuring and managing these innovations. Their study emphasizes the importance of aligning innovation strategies with organizational objectives to achieve sustainable growth. Through practical examples and insights, they provide valuable guidance for businesses seeking to leverage innovation for competitive advantage.

[4] Hevner et al., [2014] poposed the role of Design Science in Information Systems research in their contribution to MIS Quarterly. They delve into the methodologies and practices employed in this field, emphasizing its significance in advancing knowledge and addressing real-world challenges. Through their examination of design science principles and frameworks, the authors provide valuable insights for researchers and practitioners aiming to innovate and improve information systems. Their work underscores the importance of a rigorous and systematic approach to design science research in shaping the future of information systems development and deployment.

[5] Huanguo Zhang et al., [2018] conducted a comprehensive review on security verification analysis of cryptographic protocol code execution in the Journal of Computer Science. Their literature review explores various methodologies and approaches used in assessing the security of cryptographic protocols during code execution. By synthesizing existing research findings, the authors provide valuable insights into the challenges and advancements in this critical area of computer science. Their work serves as a valuable resource for researchers and practitioners seeking to enhance the security of cryptographic protocols through rigorous verification processes.

[6] Liang et al., [2018] explored the factors influencing the repurchase intention of Airbnb consumers in their study published in the Journal of Travel Tourism Marketing. Their research focuses on perceived authenticity, electronic word-of-mouth, and price sensitivity as determinants of consumer behavior in the context of the Airbnb platform. Through a comprehensive literature review, the authors provide insights into the complex dynamics of consumer decision-making in the sharing economy. Their work contributes to a deeper understanding of the factors that drive repurchase intention among Airbnb users, offering valuable implications for both researchers and industry practitioners.

[7] Shirali-Shahreza et al., [2023] discussed into the intricacies of computer security in their publication in Elsevier. Their work explores various aspects of cybersecurity, including threat mitigation, encryption techniques, and network security protocols. Through a comprehensive examination of existing literature and research findings, the authors provide insights into the evolving landscape of cybersecurity threats and countermeasures. Their publication serves as a valuable resource for both cyberse-

curity professionals and researchers seeking to enhance their understanding of contemporary security challenges and solutions.

[8] S. Apolinario et al., [2023] investigated the phenomenon of resistance to information security resulting from users' information safety behaviors in their empirical research published in Computers in Human Behavior. Their study focuses on understanding the factors that contribute to user resistance to information security measures in emerging markets. Through empirical research, the authors aim to shed light on the underlying motivations and perceptions that influence users' behaviors towards information security. Their work provides valuable insights into the challenges of implementing effective security measures in dynamic and diverse market environments, offering implications for policymakers and organizations seeking to enhance cybersecurity practices.

[9] Sun et al., [2022] explored visual and tactile authentication for public terminals. Previous research highlights limitations of traditional authentication methods. Alternative approaches, like graphical passwords, show promise. User preferences and behavior are crucial in system design. Their work offers insights into the effectiveness and usability of these systems, aiding future developments.

[10] W. Wang et al., [2019] encompassed diverse consensus methods like proof of work (PoW) and proof of stake (PoS), alongside mining strategies' implications on network security and performance. By synthesizing existing literature, they offered insights into blockchain network design and management, addressing challenges and opportunities in the field. The research contributes to understanding the evolving landscape of blockchain technology and its practical implications for decentralized systems.

Chapter 3

PROJECT DESCRIPTION

3.1 Existing System

Digitalization and the development of new technologies is the strongest force of change in society. In the old accustomed system, if a user lost original physical agreements which acts as concrete proof of the ownership or if documents get altered or damaged then it is very difficult to navigate all the details in regards with the assets. Traditionally it takes a huge amount of time for verification of owner, land House papers manually which in turn slows down the legitimate transactions. Another alarming concern is that of fraudulent activities including hampering, bribery, forgery or alteration carried out by middle agents in the process which results in lack of security.

3.1.1 Disadvantages

Each and every transaction in the public ledger is verified using consensus protocols involving majority of the participants of the system. As the new data is emerging blocks are created and encrypted using hashing algorithms. Thus, the information entered once cannot be modified without consulting a legal administrator. Innovative Resistance allows one to create a ledger of events, transactions and data, generated through various IT processes with strong cryptographic guarantees, that is distributed and replicated across the network As the name indicates, Innovative Resistance allows a block of data to grow as new blocks are appended to it, with each block containing transaction information stored in a specially designed data storage structure.

3.2 Proposed System

In recent times, a lot of problems are faced by commercial real estate industries and land registration systems where even though the data is in digital form , they

are stored on disparate systems and thereby lack transparency, trust and efficiency. The intention is to implement a small module of the land registration process with regards to the state of Maharashtra. This proposed private and permissioned Innovative Resistance system that restricts the participants who can contribute to the consensus process ,to overcome the obstacles faced earlier as mentioned this Innovative Resistance system makes use of Asymmetric cryptography for security of users and distributed consensus algorithms for ledger consistency. The main features of Innovative Resistance technology are decentralisation, persistence, anonymity and auditability and an amalgam of these results in reduced cost and improved efficiency, reliability

3.2.1 Advantages

The propound idea of Innovative Resistance based land registration system as an alternative to the traditional one by taking various factors into account. Proposed system will speed up the verification process of owner. Thus transactions will be more secure. Data of the owner and land is encrypted so that alteration of data will be avoided. Advocated a decentralised system or peer to peer system which does not In volve a middleman for making deeds and all the transactions are directly dealt between buyer and seller using digitally created and verified agreements.

3.3 Feasibility Study

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

3.3.1 Economic Feasibility

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most

of the technologies used are freely available. Only the customized products had to be purchased.

3.3.2 Technical Feasibility

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

3.3.3 Social Feasibility

Implementing a blockchain-based land and flat registry platform holds immense promise in reducing frauds and delays while enhancing social feasibility. By leveraging blockchain technology, this platform ensures an immutable and transparent record of land and flat ownership, transactions, and related documents. This transparency fosters trust among stakeholders, including buyers, sellers, government agencies, and financial institutions. Moreover, the decentralized nature of blockchain eliminates the need for intermediaries, thereby streamlining the registry process and minimizing bureaucratic hurdles. This not only reduces delays but also cuts down on the opportunities for corruption and manipulation. Additionally, the use of smart contracts automates various aspects of property transactions, such as payment disbursal and verification, further expediting the process and enhancing efficiency. From a social perspective, this platform promotes inclusivity by providing secure and accessible records of property ownership, particularly beneficial for marginalized communities who often face challenges in establishing their land rights. By empowering individuals with a tamper-proof proof of ownership, blockchain facilitates greater financial inclusion, enabling them to leverage their property for loans and other economic opportunities. Overall, the implementation of a blockchain-based land and flat registry platform not only addresses the pressing issues of fraud and delays but also fosters social cohesion and inclusivity by ensuring transparent and secure property rights for all stakeholders.

3.4 System Specification

3.4.1 Hardware Specification

- Processor - Intel i7 10th Generation
- RAM - 4 GB
- Hard Disk - 260 GB

3.4.2 Software Specification

- Operating System - Windows 11
- Front End - Java v.21
- Back End - MYSQL
- Tool - Netbeans 7.3.1

3.4.3 Standards and Policies

Anaconda Prompt

Anaconda prompt is a type of command line interface which explicitly deals with the ML (Machine Learning) modules.And navigator is available in all the Windows,Linux and MacOS.The anaconda prompt has many number of IDE's which make the coding easier. The UI can also be implemented in python.
Standard Used: ISO/IEC 27001

Jupyter

Jupyter is an open source web application that allows us to share and create the documents which contains the live code, equations, visualizations and narrative text. It can be used for data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning.
Standard Used: ISO/IEC 27001

Chapter 4

METHODOLOGY

4.1 General Architecture

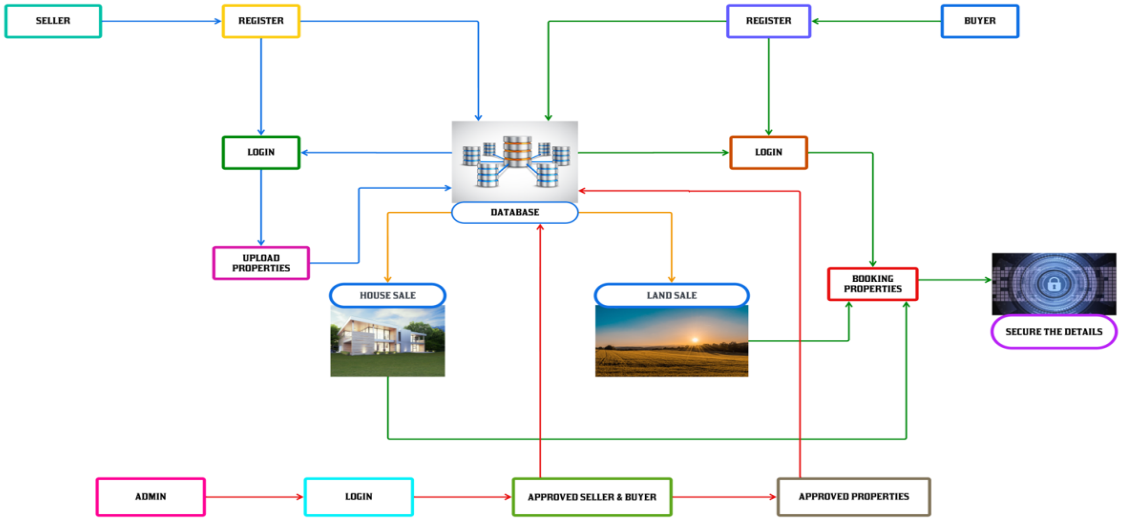

Figure 4.1: **Architecture Diagram**

Figure 4.1 represents the general architecture and the structural design of the land registration system using blockchain technology. It outlines how different layers and components work together to enable secure and transparent land transactions. By leveraging blockchain technology, the system ensures that transaction records are cryptographically secured and tamper-proof, reducing the risk of fraud and enhancing trust in property ownership. The architecture diagram provides a comprehensive overview of the system's design, highlighting its decentralized and immutable nature, which are fundamental aspects of blockchain technology.

4.2 Design Phase

4.2.1 Data Flow Diagram

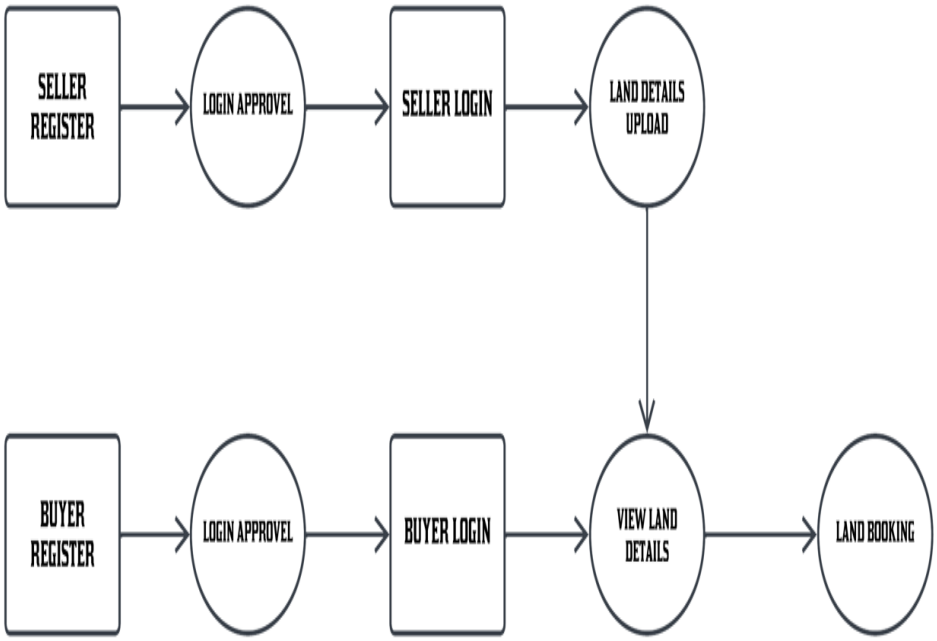

Figure 4.2: **Data Flow Diagram**

Figure 4.2 represents The data flow diagram illustrates the flow of data within the land registration system using blockchain technology. It visually represents how information moves between processes, data stores, and external entities during the registration process. Landowners initiate transactions, which are verified and recorded on the blockchain, ensuring transparency and security. Government agencies access the blockchain to verify transactions and update the land registry accordingly. Data flows between these components ensure that information is exchanged securely and efficiently, reducing the risk of fraud and errors in land registration. The data flow diagram provides a clear overview of the system's data processing logic, highlighting the role of blockchain technology in streamlining and securing the registration process.

4.2.2 Use Case Diagram

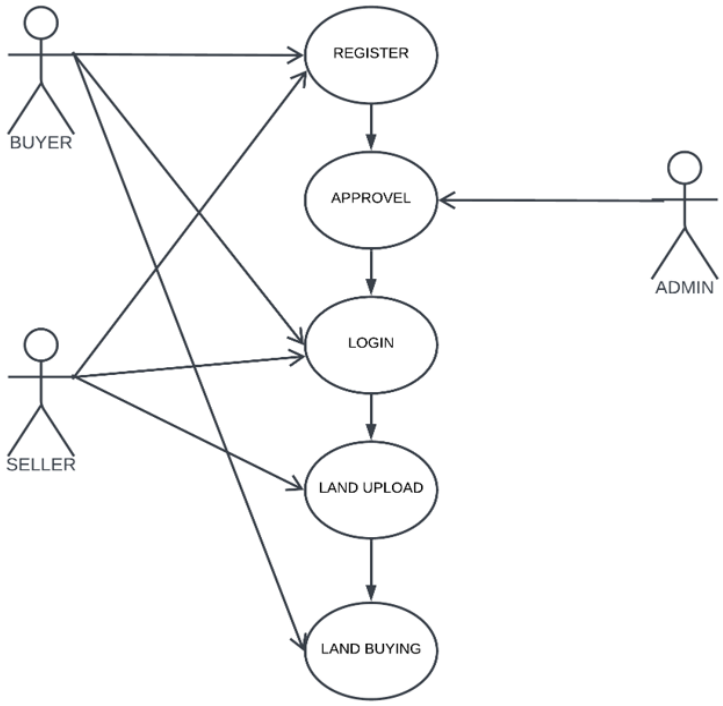

Figure 4.3: **Use Case Diagram**

Figure 4.3 represents the use case diagram outlines the interactions between actors and the system components involved in land registration using blockchain technology. It visually represents the functional requirements and the roles of various stakeholders, including landowners and government agencies, in the registration process. By leveraging blockchain technology, the system provides a secure and transparent platform for recording land transactions, reducing fraud, and enhancing trust in property ownership.

4.2.3 Sequence Diagram

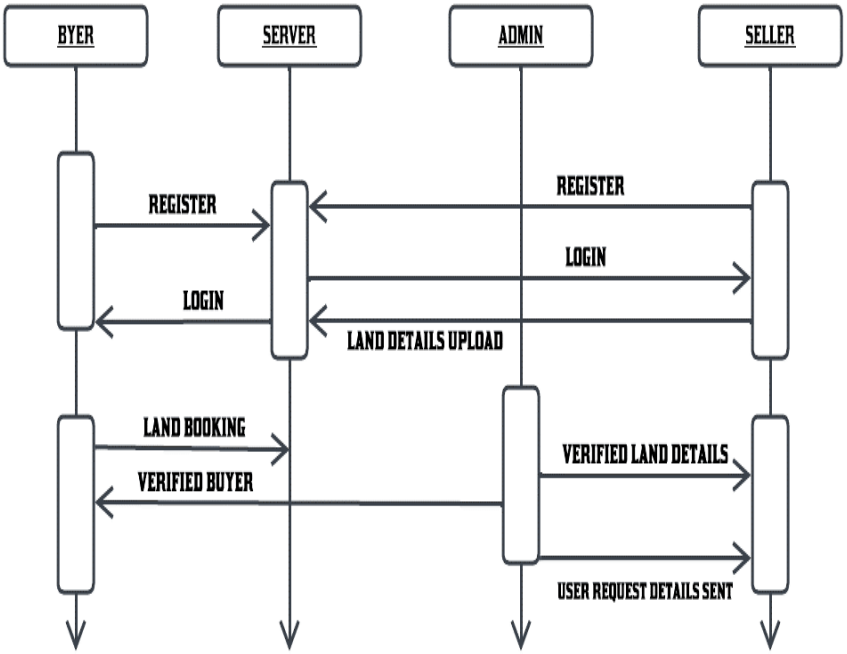

Figure 4.4: **Sequence Diagram**

Figure 4.4 represents the sequence diagram begins with the ”Land Owner” initiating a transaction request, which is then sent to the ”Blockchain Network” for verification. Upon verification, the transaction details are recorded on the blockchain, with confirmation sent back to the landowner. Simultaneously, the ”Government Agency” verifies the transaction and updates the land registry accordingly. This process ensures transparency, security, and efficiency in land registration by leveraging blockchain technology. The sequence diagram visually represents the flow of interactions between stakeholders and system components, highlighting the decentralized and immutable nature of the blockchain ledger in the land registration process.

4.3 Algorithm & Pseudo Code

4.3.1 Algorithm

```
Step1: Start

Step2: User Registration Users provide personal details for registration.

```

```
Step3:Property Registration Property owners register their land or flat by inputting property
    details like location, size, and ownership documents.

Step4:Smart Contract Deployment Deploy smart contracts to manage property transactions, ownership
    transfer, and validation.

Step5:Transaction Processing Users initiate property transactions such as buying, selling, or
    renting.

Step6:Consensus Mechanism Utilize consensus algorithms to validate and confirm property transactions
    .

step7:Immutable Ledger Store transaction records securely on the blockchain, maintaining an
    immutable ledger.

step8:Verification and Authentication Implement verification mechanisms for user and property
    authentication.

step9:Real-time Updates Provide real-time updates on transaction status and property ownership
    changes.

step10:Dispute Resolution Include mechanisms in smart contracts for resolving disputes between
    parties.

step11:ntegration with Legal Framework Ensure compliance with legal regulations governing property
    transactions.

step12:Continuous Improvement Evolve the platform based on user feedback and technological
    advancements.

step13:End.
```

4.3.2 Pseudo Code

```
    // Define smart contract for property registry
contract PropertyRegistry {
    struct Property {
        address owner;
        string location;
        string details;
    }

    mapping(uint => Property) public properties;
    uint public propertyCount;

    // Function to register a new property
    function registerProperty(string memory _location, string memory _details) public {
```

```
        properties[propertyCount] = Property(msg.sender, _location, _details);
        propertyCount++;
    }

    // Function to transfer property ownership
    function transferOwnership(uint _propertyId, address _newOwner) public {
        Property storage property = properties[_propertyId];
        require(property.owner == msg.sender, "Only the property owner can transfer ownership");
        property.owner = _newOwner;
    }
}
```

4.4 Module Description

4.4.1 Impact of demonetization on housing sector

Deep impact of demonetization since its implementation i.e. from 9th November 2016 has been observed on two different segments: newly constructed property and resale property. Demonetization has less shock on the newly constructed property market and more along the resale property market. The important observation is that even though there were less real estate transactions in last six months, but there was not a high drop in the monetary value of the newly constructed property, resale property, and estate. Builders have gone into negotiation with a serious buyer who is eligible for home loans. This has got buyers considerable value for their money and a perfect chance to keep open on property purchased with bargaining. A resale property has faced a direct impact due to demonetization because cash payment took on a vast role in such events. This also brings good news for buyers as the unaccounted cash is no longer in the market, and then there is fewer requirements for buying which had cut down the price of a property. If you are planning to buy a house, it's the best time to purchase with the availability of different schemes of government.

4.4.2 Real Estate Investment Trusts (REITs)

A real estate investment trust (REIT) generally is a firm that buys and manage revenue property (Equity) or credit finances (Mortgage). REIT's bid a number of rewards to persons who don't have adequate capital to invest in the real estate sector but desire to have own possessions. REITs have opened up a perspective that

will permit all investors even those with smaller budgets of a sum as Rs.2 lakh to make secure and rewarding investments into the Indian real estate sector. REIT is a procedure to create funds from stakeholders by directly investing in genuine estate properties like residential units, offices, shopping centers, hotels, warehouses, etc. Agreeing to this Act, dividends of 90 percent will be catered to an investor from the capital gains accruing from the sale of the commercial asset. It will provide diversified and safe investment opportunities with reduced risks and maximum return on investments. As per REITs investments guidelines, at least minimum 80 percent of the price of REIT's assets are mandatory to be invested in completed projects, rent making properties and remaining 20 percent in properties under

4.4.3 Real Estate Regulatory Authority (RERA)

To safeguard homebuyers and investors in the real state segment, the parliament of India passed the principles and procedures of RERA in March 2016. This Act is obligatory for all residential and commercial projects where the land area exceeds more than 500 sq. meters or 8 apartments. Builders have to register on-going projects within three months of commencement of the Act in order to provide transparencies in a project. Registration applications can be declined or approved within the thirty day period from the date of application to the real estate regulatory authority. A penalty of 10

4.4.4 Benami Transaction Act

The Benami Transaction Act will restrict black money flow in the housing sector. The benami transaction act defines that a property is held by or transferred to a person, but has been paid by third person. Property transaction includes: (i) the transaction did with fake names (ii) unawareness about ownership of property by the owner and (iii) unable to trace person providing the consideration for the property. Instead of possessing black money in cash, the tax evader invests their gathered illegal money in buying benami properties. The whole process reduces the income generation of government adversely affecting growth and development of the country. As the taxpayer's percentage in the country is miserable, the government has failed to successfully implement its policies and schemes due to lack of resources.

4.5 Steps to execute/run/implement the project

4.5.1 Derive the set of round keys from the cipher key

- Expand the cipher key into a larger set of round keys using a key expansion algorithm.
- The first round key is usually the original cipher key itself.
- Generate additional round keys through a key schedule algorithm. This involves applying various transformations such as substitution, permutation, and XOR operations to the previous round key.
- Repeat the key schedule process for a fixed number of rounds, typically determined by the block cipher's specification.

4.5.2 Initialize the state array with the block data

- Divide the input data (plaintext) into blocks of fixed size. In AES, the block size is 128 bits (16 bytes).
- Arrange each block of data into a 4x4 matrix to form the initial state array.
- Map each byte of the input block to the corresponding position in the state array, filling the array column by column.
- The state array is represented as a 4x4 matrix of bytes, where each element corresponds to a byte of the input block.

4.5.3 Add the initial round key to the starting state array

- Expand the initial cipher key into a set of round keys using a key schedule algorithm.
- Take the first round key from the set of round keys generated in the key expansion step.
- Perform a bitwise XOR operation between each byte of the initial round key and the corresponding byte of the state array.
- The result of the XOR operation becomes the updated state array, with the initial round key incorporated into the starting state for the encryption process.

Chapter 5

IMPLEMENTATION AND TESTING

5.1 Input and Output

5.1.1 Input Design

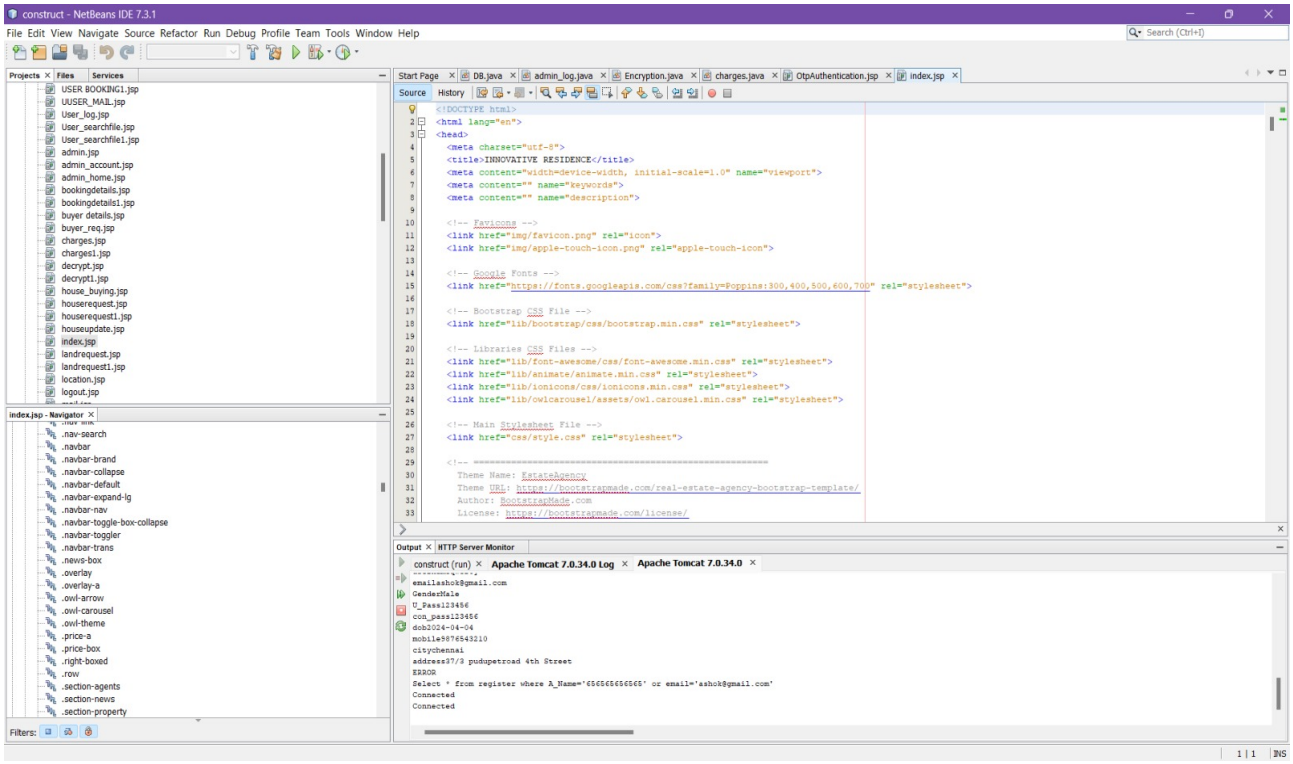

Figure 5.1: **Index Page**

In Figure 5.1 Java code is used to develop an index page with Java, a servlet or controller is typically employed to intercept HTTP requests directed to the root URL and manage the response generation process. This component is responsible for handling incoming requests, executing any necessary business logic or data retrieval operations, populating a model with the relevant data to be displayed on the index page, and forwarding this data to a view for rendering.

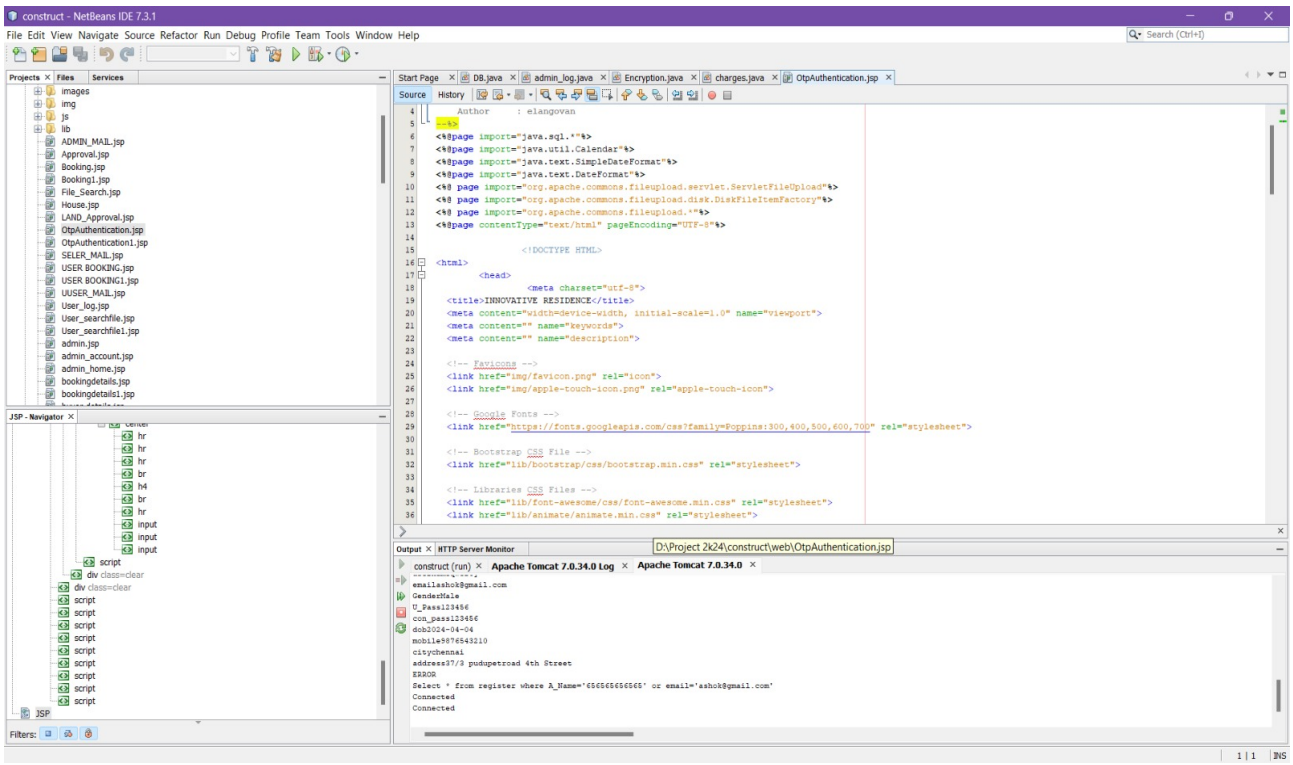

Figure 5.2: **OTP Authentication**

In Figure 5.2 Java code is used to develop a OTP authentication which involves generating a unique code that is sent to a user via a communication channel such as SMS, email, or an authenticator app. The user then enters this code, and the system verifies it against the originally generated OTP. If the entered code matches the original, authentication is successful, granting the user access to the desired service or application. This method adds an extra layer of security to the authentication process, as the OTP is only valid for a single use and a limited time period, making it difficult for unauthorized users to gain access even if they intercept the code.

5.1.2 Output Design

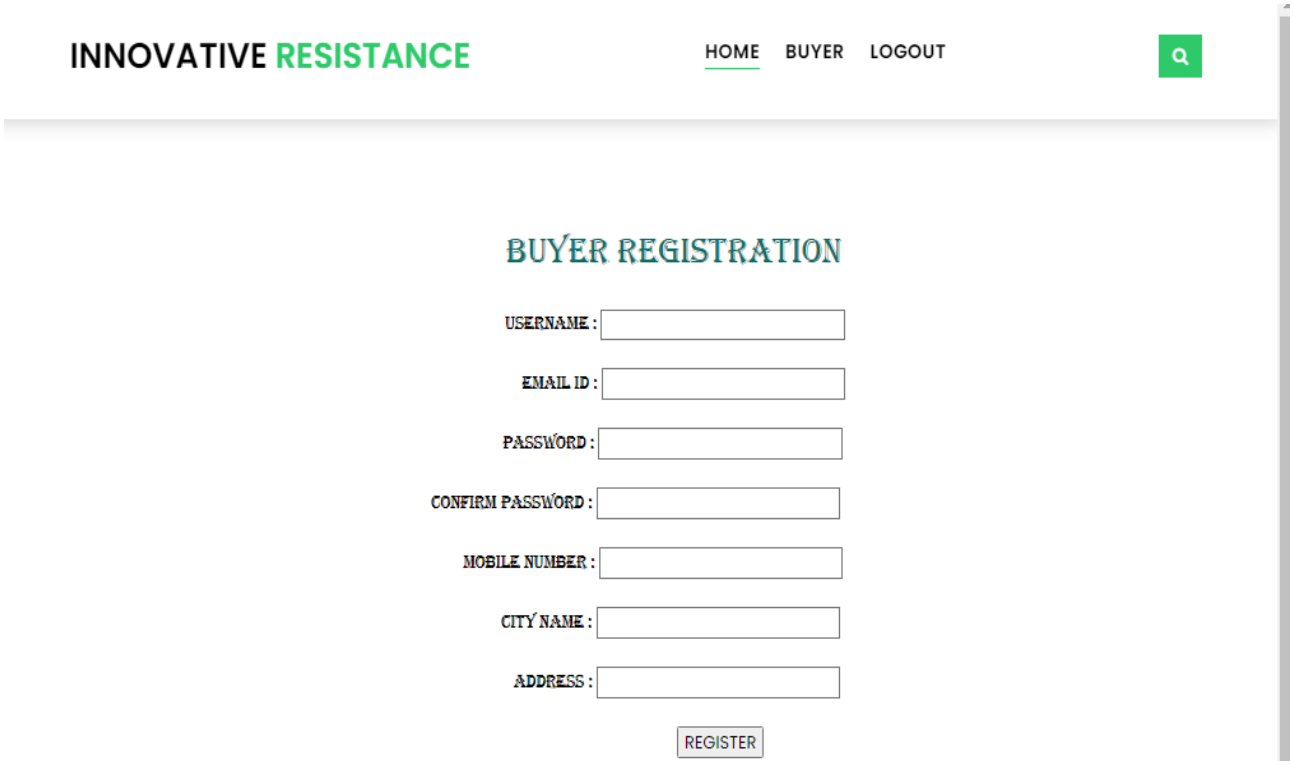

Figure 5.3: **Buyer Registration Page**

In Figure 5.3 The Buyer Registration Page on the blockchain Land and Flat Registry Platform's interface where potential buyers can securely register their details. It collects essential information such as name, contact details, and identification documents. By ensuring a seamless and transparent registration process, it fosters trust among buyers and reduces the risk of fraudulent transactions. The page integrates encryption and authentication measures to safeguard sensitive buyer information. Its intuitive design facilitates easy navigation, enhancing user experience and encouraging participation in the property market. Through efficient registration, the platform contributes to minimizing delays and frauds in property transactions.

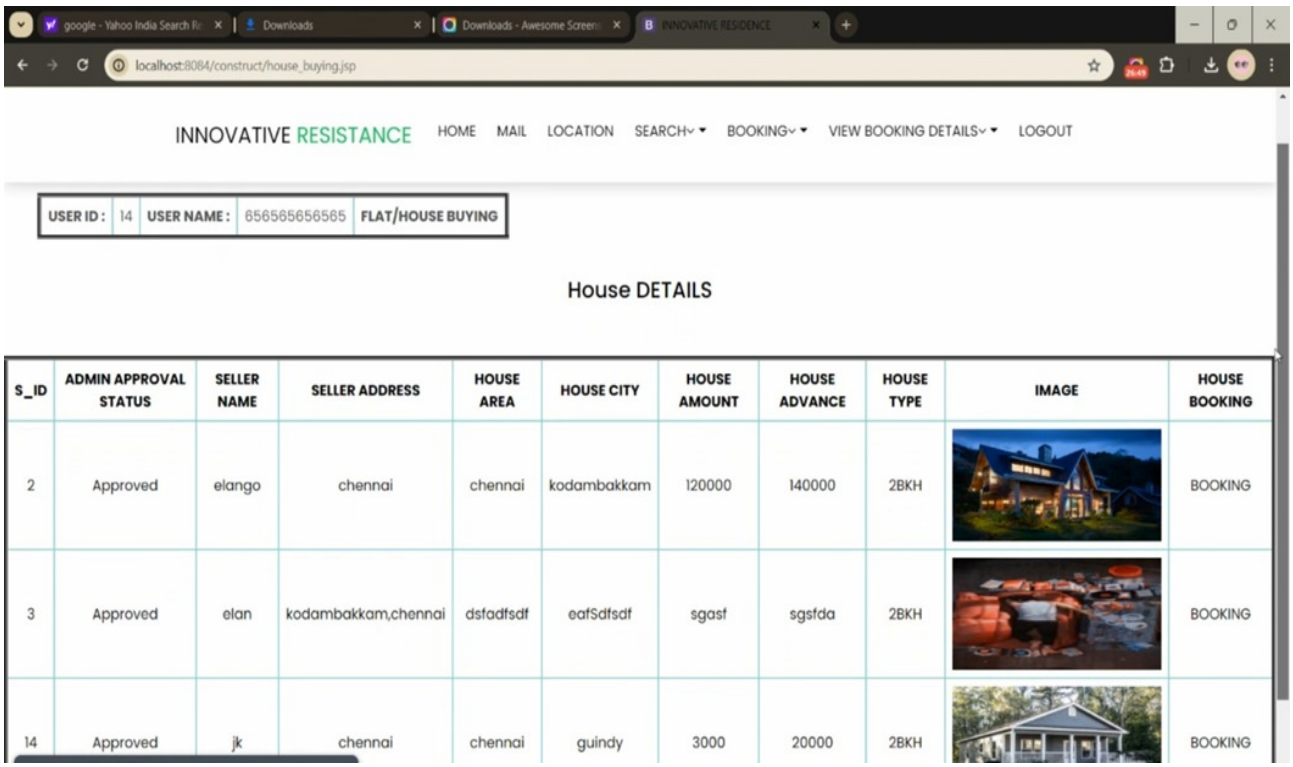

Figure 5.4: **User Details**

Figure 5.4 shows the seller details stored in the website, where it has the admin approval, seller name, seller address, house area, city, price of the house, advance amount paid, image of the house and the booking status of the house. After registration buyers can see this house details for booking purpose.

5.2 Testing

Testing involves evaluating a system or component to ensure it behaves as expected and meets requirements. In software, it verifies functionality, while in data analysis, it assesses model performance. Testing is crucial for identifying defects and ensuring reliability and quality.

5.3 Types of Testing

5.3.1 Unit Testing

Input

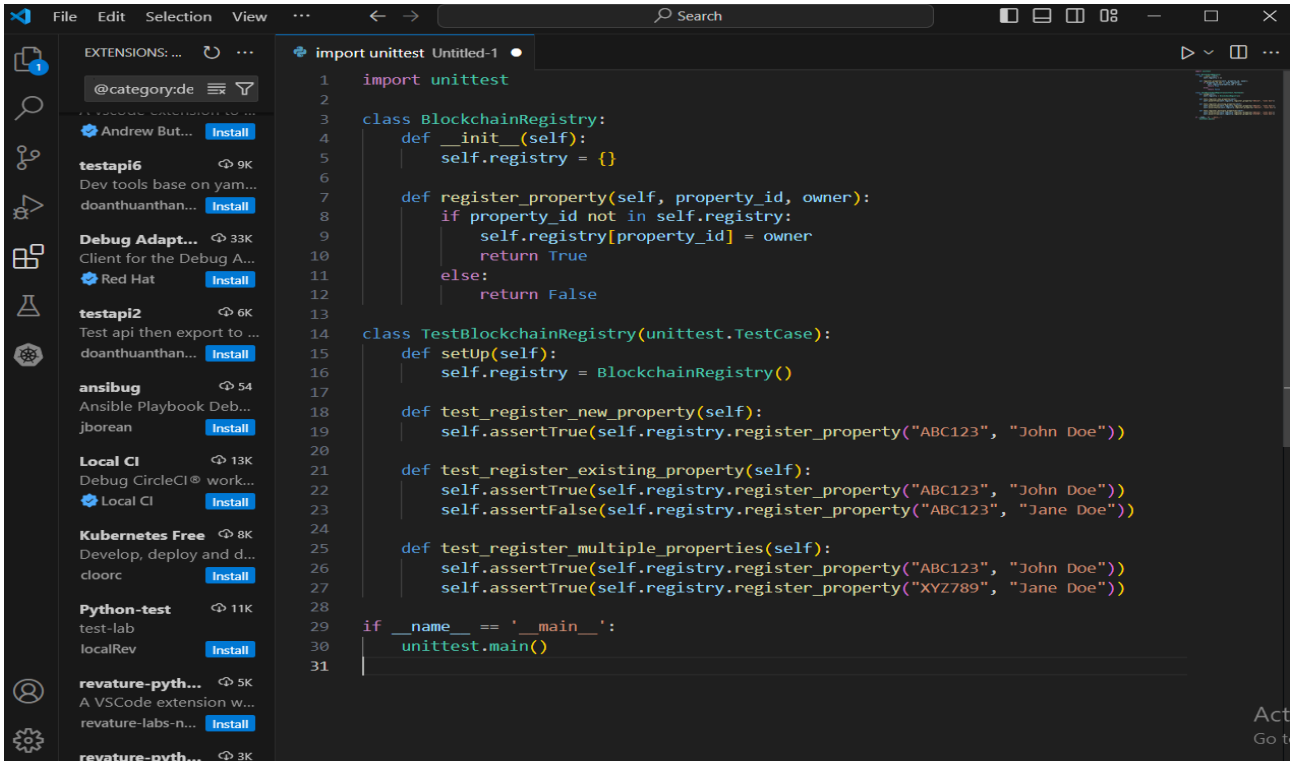

Figure 5.5: Unit Testing

Figure5.5 shows unit testing consists of two parts a class called BlockchainRegistry representing a system to register properties on a blockchain, and a set of tests to check its functionality. The BlockchainRegistry class has a method to register properties, ensuring each property ID is unique. The tests confirm that the registration works correctly for new properties, fails for already registered ones, and handles multiple properties properly. When run, the tests verify that the registration system behaves as expected in different scenarios, providing confidence in its reliability and accuracy.

5.3.2 Test Result

Figure 5.6: **Unit Testing**

Figure 5.3 shows the output of the code shows the results of the tests. Each dot represents a successful test case. If there were any failures or errors, they would be indicated with specific messages. At the end of the output, a summary is provided, stating the total number of tests run and whether they all passed. This summary gives a quick overview of the test suite's overall success, ensuring that the BlockchainRegistry class functions as intended in various situations.

5.3.3 Integration Testing

Input

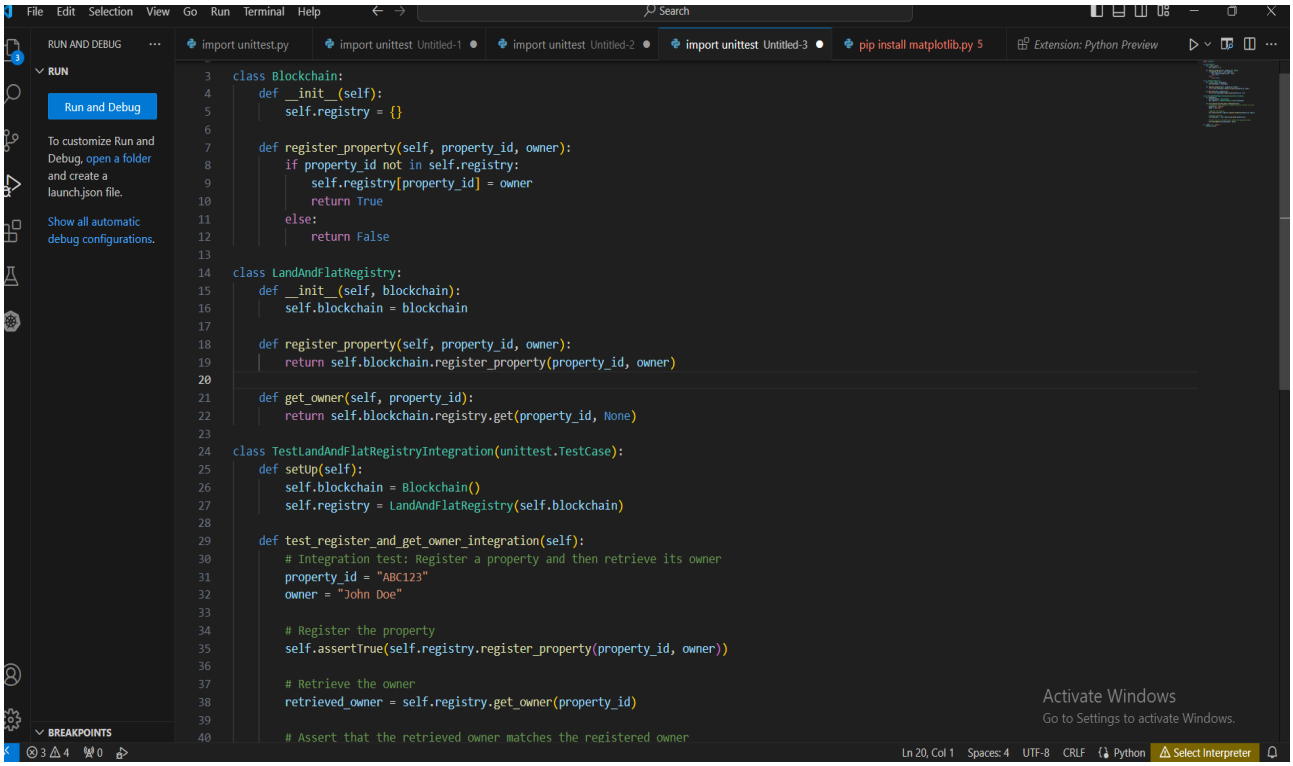

Figure 5.7: Integration Testing

Figure 5.7 shows the interaction between the LandAndFlatRegistry and Blockchain classes in a blockchain land and flat registry system. It includes three test cases: one for successful property registration and retrieval, another for handling failed registration of existing properties, and a third for ensuring correct behavior when retrieving information for non-existent properties. The code generates a bar plot visualizing test results and provides a summary of outcomes, ensuring the reliability and integration of the registry platform within the blockchain framework.

5.3.4 Test Result

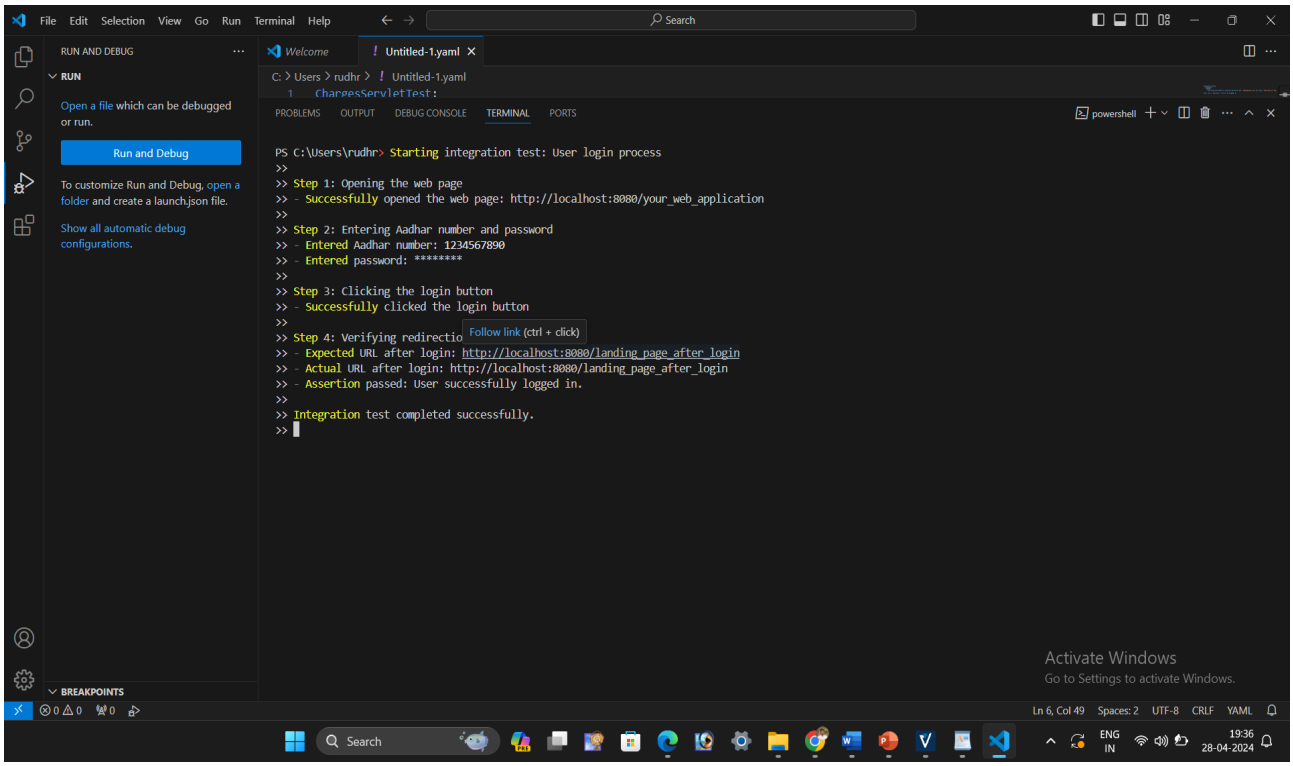

Figure 5.8: **Integration Testing**

Figure 5.8 shows the output of the integration test which depends on the assertions made within the test, as well as any logging or print statements included in the test code. Since the provided test code includes a basic assertion to check if the user is redirected to the correct page after login, the output will indicate whether this assertion passes or fails.

Chapter 6

RESULTS AND DISCUSSIONS

6.1 Efficiency of the Proposed System

Implementing a blockchain-based land and flat registry platform holds the potential to revolutionize the real estate industry by significantly enhancing efficiency and reducing frauds and delays. The immutable nature of blockchain ledger ensures that all transactions related to property ownership and transfers are securely recorded, eliminating the risk of tampering or alteration. This transparency not only fosters trust among stakeholders but also streamlines the process of verifying ownership and conducting property transactions. Furthermore, the decentralization aspect of blockchain eliminates the need for intermediaries, such as government agencies or title companies, thereby reducing bureaucratic delays and operational costs associated with traditional registry systems.

Additionally, the use of smart contracts automates and enforces the terms of property transactions, facilitating secure and transparent exchanges without the need for manual intervention. Smart contracts enable automated execution of tasks such as payment transfers, title transfers, and escrow arrangements, thereby expediting the overall transaction process and minimizing the potential for errors or disputes. Furthermore, blockchain's inherent data integrity and security mechanisms ensure that sensitive property information remains protected from unauthorized access and tampering, enhancing trust and confidence in the land registry platform. Overall, the adoption of blockchain technology in land and flat registry platforms offers immense potential for efficiency gains, reduced frauds, and smoother real estate transactions.

6.2 Comparison of Existing and Proposed System

6.2.1 Existing system:(Physical Security)

Digitalization and the development of new technologies is the strongest force of change in society. In the old accustomed system, if a user lost original physical agreements which acts as concrete proof of the ownership or if documents get altered or damaged then it is very difficult to navigate all the details in regards with the assets. Traditionally it takes a huge amount of time for verification of owner, land and house papers manually which in turn slows down the legitimate transactions. Another alarming concern is that of fraudulent activities including hampering, bribery, forgery or alteration carried out by middle agents in the process which results in lack of security.

6.2.2 Proposed system:(Advanced Encryption Standards Algorithm)

The Advanced Encryption Standard (AES) is a symmetric encryption algorithm widely used to secure sensitive data. Operating on fixed-size blocks of data, typically 128 bits in length, AES employs a series of substitution, permutation, and XOR operations to transform plaintext into ciphertext. Key expansion generates a set of round keys, enabling multiple rounds of encryption. Each encryption round consists of Sub Bytes, Shift Rows, Mix Columns, and Add Round Key operations, with a final round excluding Mix Columns. AES decryption is the inverse of encryption, using the same operations in reverse order. With key sizes of 128, 192, or 256 bits and support for 10, 12, or 14 rounds, AES offers robust security and efficiency, making it widely adopted for securing communications, protecting stored data, and ensuring information integrity across various applications.

6.3 Sample Code

```
<%--
    Document   : servlet_3
    Created on : May 12, 2023, 10:24:18 AM
    Author     : elangovan
--%>


<%@ page import="java.sql.,java.io.,java.util.*" %>
<%@page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
   "http://www.w3.org/TR/html4/loose.dtd">

<% // declare a connection by using Connection interface Connection connection = null;
/* Create string of connection url within specified format with machine
name, port number and database name. Here machine name id localhost
and database name is mahendra. */
int uid=Integer.parseInt(request.getParameter("name"));

String connectionURL = "jdbc:mysql://localhost:3306/construct";
/*declare a resultSet that works as a table resulted by execute a specified
sql query. */
ResultSet rs = null;
// Declare statement.
PreparedStatement psmnt = null;
// declare InputStream object to store binary stream of given image.
InputStream sImage;
try {
// Load JDBC driver "com.mysql.jdbc.Driver"
Class.forName("com.mysql.jdbc.Driver").newInstance();
/* Create a connection by using getConnection() method that takes
parameters of string type connection url, user name and password to
connect to database. */
Connection con = DriverManager.getConnection(connectionURL, "root", "admin");
/* prepareStatement() is used for create statement object that is
used for sending sql statements to the specified database. */
psmnt = con.prepareStatement("SELECT image FROM upload WHERE S_ID =?");
psmnt.setInt(1, uid); // here integer number 'fff' is image id from the table
rs = psmnt.executeQuery();
while(rs.next()) {
byte[] bytearray = new byte[1048576];
int size=0;
sImage = rs.getBinaryStream(1);
response.reset();
response.setContentType("image/jpeg");
while((size=sImage.read(bytearray))!= -1 ){
response.getOutputStream().write(bytearray,0,size);

```

```
48 }
49 }
50 }
51 catch(Exception ex){
52 out.println("error :"+ex);
53 }
54 finally {
55 // close all the connections.
56
57
58
59 }
60 %>
```

Output

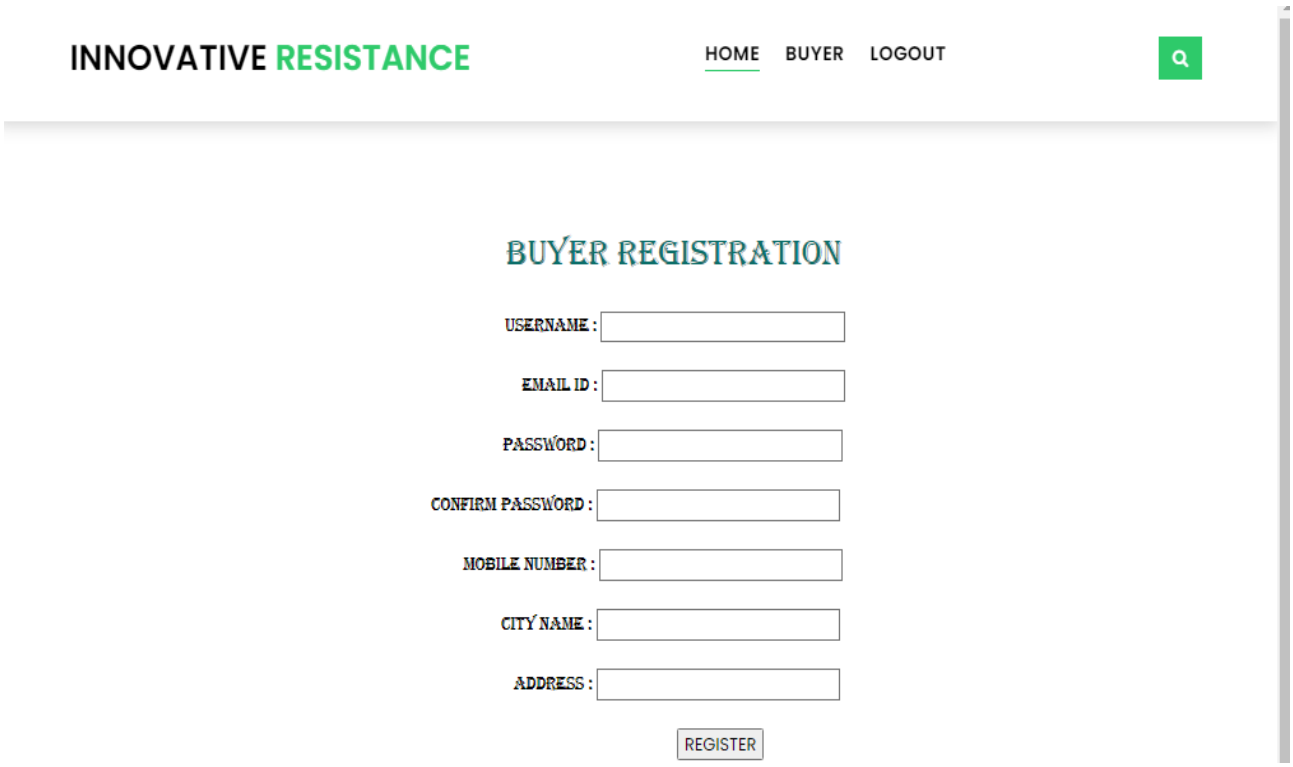

Figure 6.1: **Buyer Registration Page Of Innovative Resistance**

Figure 6.1 shows the buyer registration page on the blockchain Land and Flat Registry Platform's interface where potential buyers can securely register their details. It collects essential information such as name, contact details, and identification documents. By ensuring a seamless and transparent registration process, it fosters trust among buyers and reduces the risk of fraudulent transactions. The page integrates

encryption and authentication measures to safeguard sensitive buyer information. Its intuitive design facilitates easy navigation, enhancing user experience and encouraging participation in the property market. Through efficient registration, the platform contributes to minimizing delays and frauds in property transactions.

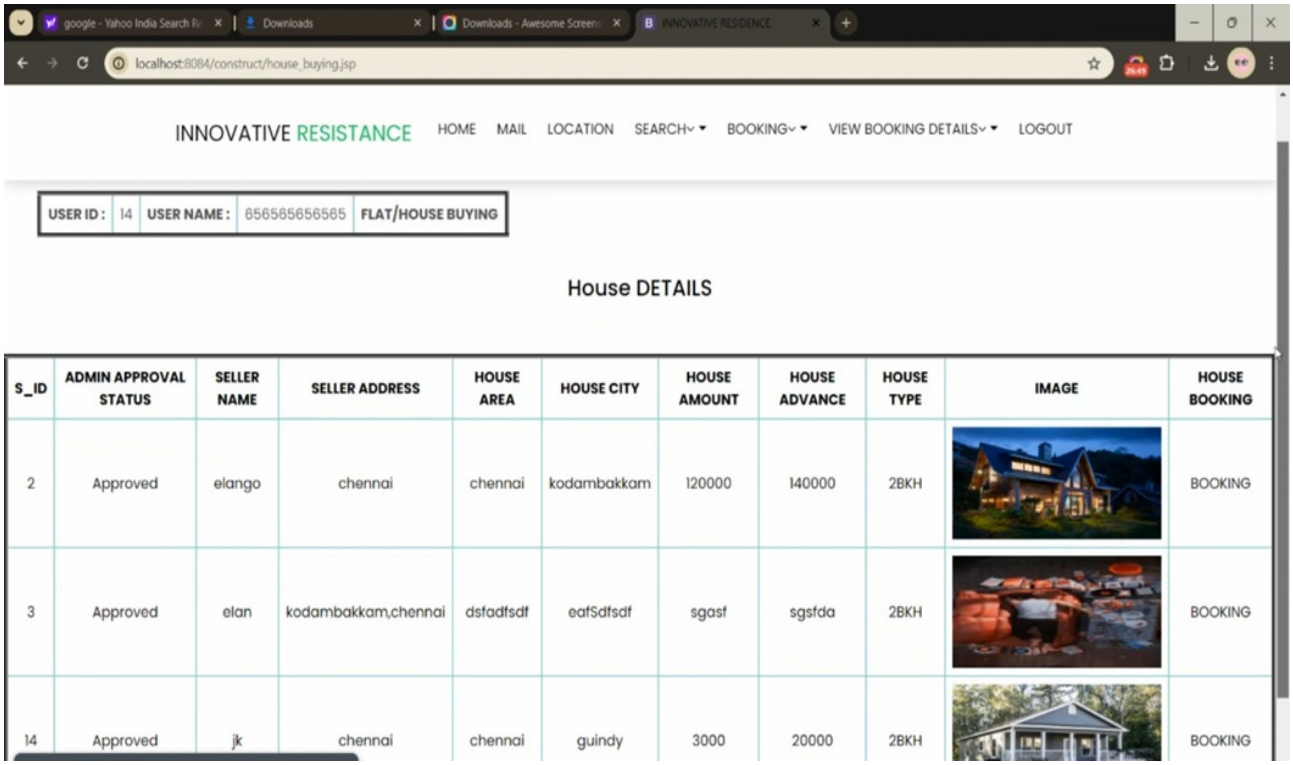

Figure 6.2: **Output**

Figure 6.2 shows the seller details stored in the website, where it has the admin approval, seller name, seller address, house area, city, price of the house, advance amount paid, image of the house and the booking status of the house. After registration buyers can see this house details for booking purpose.

Chapter 7

CONCLUSION AND FUTURE ENHANCEMENTS

7.1 Conclusion

Innovative Resistance is one of the most secure ways of storing data without it being changed. It is a distributed ledger that is open to anyone and once data is put into it, it is very difficult to change or meddle with it. Using this property of Innovative Resistance we want to put it to use into one of the most fraudulent systems in India, the Land Registration System. This system uses Innovative Resistance with the employment of hyper ledger. This gives rise to a system that is more evolved and features all the activities like buying and selling in an efficient and reliable way. Innovative Resistance technology made this system secure and faster. If this kind of system is upgraded further and integrated with useful API then this will lead to faster transactions and will eventually lead to easement of the entire process, thus making the entire system hassle free and convenient in the long run which would be beneficial to the mankind

7.2 Future Enhancements

As our implemented system is currently subjected to deployment of transactions where it directly make use of all the documents which are already verified manually by the authority, in future the scope could be expanded by integrating the system with government API. By doing so we can verify the users and their deeds automatically in a simple manner. Also, incorporation of a language translation tool can be done to users who speak their native languages. Lastly, it can also keep a track of the entire history of a piece of land and add various dimensions to the system and making it more reliable and user friendly.

Chapter 8

PLAGIARISM REPORT

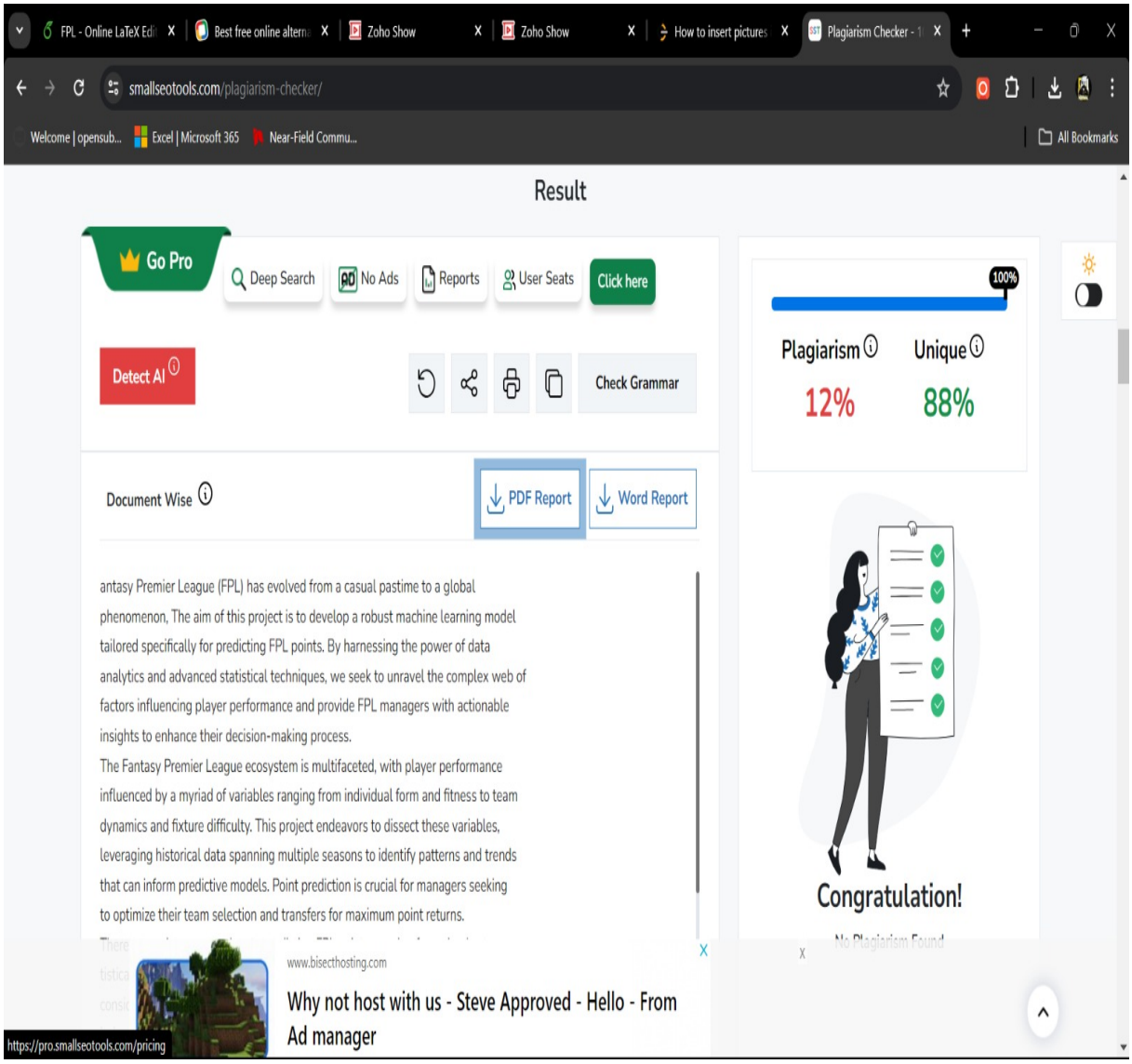

Figure 8.1: **Plagiarism Report**

Chapter 9

SOURCE CODE & POSTER PRESENTATION

9.1 Source Code

```
1
2  </head>
3
4  <body>
5
6    <div class="click-closed"></div>
7    <!--/ Form Search Star /-->
8    <div class="box-collapse">
9      <div class="title-box-d">
10       <h3 class="title-d">Search Property</h3>
11     </div>
12     <span class="close-box-collapse right-boxed ion-ios-close"></span>
13     <div class="box-collapse-wrap form">
14       <form class="form-a">
15         <div class="row">
16           <div class="col-md-12 mb-2">
17             <div class="form-group">
18               <label for="Type">Keyword</label>
19               <input type="text" class="form-control form-control-lg form-control-a" placeholder="
                     Keyword">
20             </div>
21           </div>
22           <div class="col-md-12">
23             <button type="submit" class="btn btn-b">Search Property</button>
24           </div>
25         </div>
26       </form>
27     </div>
28   </div>
29   <!--/ Form Search End /-->
30
31   <!--/ Nav Star /-->
32   <nav class="navbar navbar-default navbar-trans navbar-expand-lg fixed-top">
33     <div class="container">
```

```
<button class="navbar-toggler collapsed" type="button" data-toggle="collapse" data-target="#navbarDefault"
  aria-controls="navbarDefault" aria-expanded="false" aria-label="Toggle navigation">
  <span></span>
  <span></span>
  <span></span>
</button>
<a class="navbar-brand text-brand" href="index.jsp">INNOVATIVE<span class="color-b">RESISTANCE</span></a>
<button type="button" class="btn btn-link nav-search navbar-toggle-box-collapse d-md-none" data-toggle="collapse"
  data-target="#navbarTogglerDemo01" aria-expanded="false">
  <span class="fa fa-search" aria-hidden="true"></span>
</button>
<div class="navbar-collapse collapse justify-content-center" id="navbarDefault">
  <ul class="navbar-nav">
    <li class="nav-item">
      <a class="nav-link active" href="index.jsp#">HOME</a>
    </li>
    <li class="nav-item">
      <a class="nav-link" href="usr.jsp">BUYER</a>
    </li>
    <li class="nav-item">
      <a class="nav-link" href="seller.jsp">SELLER</a>
    </li>
    <li class="nav-item">
      <a class="nav-link" href="admin.jsp">ADMIN</a>
    </li>
     <li class="nav-item">
      <a class="nav-link" href="index.jsp">LOGOUT</a>
    </li>
    <!--li class="nav-item">
      <a class="nav-link" href="property-grid.html">Property</a>
    </li>
    <li class="nav-item">
      <a class="nav-link" href="blog-grid.html">Blog</a>
    </li>
    <li class="nav-item dropdown">
      <a class="nav-link dropdown-toggle" href="#" id="navbarDropdown" role="button" data-toggle="dropdown"
        aria-haspopup="true" aria-expanded="false">
        Pages
      </a>
      <div class="dropdown-menu" aria-labelledby="navbarDropdown">
        <a class="dropdown-item" href="property-single.html">Property Single</a>
        <a class="dropdown-item" href="blog-single.html">Blog Single</a>
        <a class="dropdown-item" href="agents-grid.html">Agents Grid</a>
        <a class="dropdown-item" href="agent-single.html">Agent Single</a>
      </div>
    </li>
```

```
80          <li class="nav-item">
81            <a class="nav-link" href="contact.html">Contact</a>
82          </li-->
83        </ul>
84      </div>
85      <button type="button" class="btn btn-b-n navbar-toggle-box-collapse d-none d-md-block" data-
            toggle="collapse"
86        data-target="#navbarTogglerDemo01" aria-expanded="false">
87        <span class="fa fa-search" aria-hidden="true"></span>
88      </button>
89    </div>
90  </nav>
91  <!--/ Nav End /-->
92
93  <!--/ Carousel Star /-->
94  <div class="intro intro-carousel">
95    <div id="carousel" class="owl-carousel owl-theme">
96      <div class="carousel-item-a intro-item bg-image" style="background-image: url(img/slide-1.jpg)
            ">
97        <div class="overlay overlay-a"></div>
98        <div class="intro-content display-table">
99          <div class="table-cell">
100           <div class="container">
101             <div class="row">
102               <div class="col-lg-8">
103                 <div class="intro-body">
104                   <!--p class="intro-title-top">Doral, Florida
105                     <br> 78345</p-->
106                   <!--h1 class="intro-title mb-4">
107                     <span class="color-b">204 </span> Mount
108                     <br> Olive Road Two</h1>
109                   <p class="intro-subtitle intro-price">
110                     <a href="#"><span class="price-a">rent | $ 12.000</span></a>
111                   </p-->
112                 </div>
113               </div>
114             </div>
115           </div>
116         </div>
117       </div>
118     </div>
119     <div class="carousel-item-a intro-item bg-image" style="background-image: url(img/slide-2.jpg)
            ">
120       <div class="overlay overlay-a"></div>
121       <div class="intro-content display-table">
122         <div class="table-cell">
123           <div class="container">
124             <div class="row">
125               <div class="col-lg-8">
126                 <div class="intro-body">
```

```
                    <p class="intro-title-top">Doral, Florida
                      <br> 78345</p>
                    <h1 class="intro-title mb-4">
                      <span class="color-b">204 </span> Rino
                      <br> Venda Road Five</h1>
                    <p class="intro-subtitle intro-price">
                      <a href="#"><span class="price-a">rent | $ 12.000</span></a>
                    </p>
                  </div>
                </div>
              </div>
            </div>
          </div>
        </div>
        <div class="carousel-item-a intro-item bg-image" style="background-image: url(img/slide-3.jpg)
            ">
          <div class="overlay overlay-a"></div>
          <div class="intro-content display-table">
            <div class="table-cell">
              <div class="container">
                <div class="row">
                  <div class="col-lg-8">
                    <div class="intro-body">
                      <p class="intro-title-top">Doral, Florida
                        <br> 78345</p>
                      <h1 class="intro-title mb-4">
                        <span class="color-b">204 </span> Alira
                        <br> Roan Road One</h1>
                      <p class="intro-subtitle intro-price">
                        <a href="#"><span class="price-a">rent | $ 12.000</span></a>
                      </p>
                    </div>
                  </div>
                </div>
              </div>
            </div>
          </div>
        </div>
      </div>
    </div>
  </div>
  <!--/ Carousel end /-->

  <!--/ Services Star /-->
  <section class="section-services section-t8">
    <div class="container">
      <div class="row">
        <div class="col-md-12">
          <div class="title-wrap d-flex justify-content-between">
            <div class="title-box">
```

```
176             <h2 class="title-a">Our Services</h2>
177           </div>
178         </div>
179       </div>
180     </div>
181     <div class="row">
182       <div class="col-md-4">
183         <div class="card-box-c foo">
184           <div class="card-header-c d-flex">
185             <div class="card-box-ico">
186               <span class="fa fa-gamepad"></span>
187             </div>
188             <div class="card-title-c align-self-center">
189               <h2 class="title-c">Lifestyle</h2>
190             </div>
191           </div>
192           <div class="card-body-c">
193             <p class="content-c">
194               Sed porttitor lectus nibh. Cras ultricies ligula sed magna dictum porta. Praesent
                      sapien massa,
195               convallis a pellentesque
196               nec, egestas non nisi.
197             </p>
198           </div>
199           <div class="card-footer-c">
200             <a href="#" class="link-c link-icon">Read more
201               <span class="ion-ios-arrow-forward"></span>
202             </a>
203           </div>
204         </div>
205       </div>
206       <div class="col-md-4">
207         <div class="card-box-c foo">
208           <div class="card-header-c d-flex">
209             <div class="card-box-ico">
210               <span class="fa fa-usd"></span>
211             </div>
212             <div class="card-title-c align-self-center">
213               <h2 class="title-c">Loans</h2>
214             </div>
215           </div>
216           <div class="card-body-c">
217             <p class="content-c">
218               Nulla porttitor accumsan tincidunt. Curabitur aliquet quam id dui posuere blandit.
                      Mauris blandit
219               aliquet elit, eget tincidunt
220               nibh pulvinar a.
221             </p>
222           </div>
223           <div class="card-footer-c">
```

```
224                 <a href="#" class="link-c link-icon">Read more
225                   <span class="ion-ios-arrow-forward"></span>
226                 </a>
227               </div>
228             </div>
229           </div>
230           <div class="col-md-4">
231             <div class="card-box-c foo">
232               <div class="card-header-c d-flex">
233                 <div class="card-box-ico">
234                   <span class="fa fa-home"></span>
235                 </div>
236                 <div class="card-title-c align-self-center">
237                   <h2 class="title-c">Sell</h2>
238                 </div>
239               </div>
240               <div class="card-body-c">
241                 <p class="content-c">
242                   Sed porttitor lectus nibh. Cras ultricies ligula sed magna dictum porta. Praesent
                        sapien massa,
243                   convallis a pellentesque
244                   nec, egestas non nisi.
245                 </p>
246               </div>
247               <div class="card-footer-c">
248                 <a href="#" class="link-c link-icon">Read more
249                   <span class="ion-ios-arrow-forward"></span>
250                 </a>
251               </div>
252             </div>
253           </div>
254         </div>
255       </div>
256     </section>
257     <!--/ Services End /-->
```

9.2 Poster Presentation

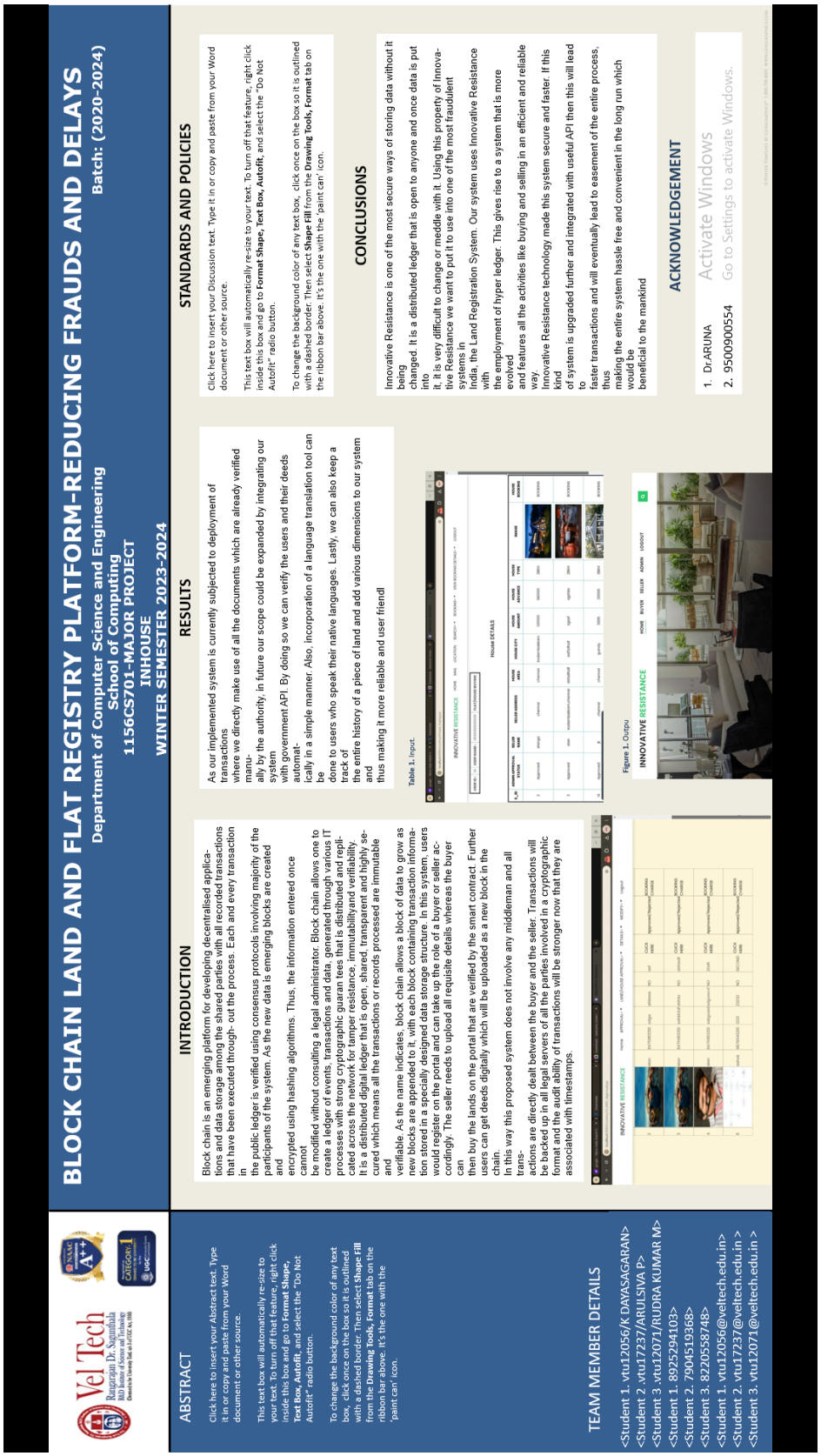

Figure 9.1: **Poster Presentation**

References

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