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A NEW FRAMEWORK IN CREDIT ALLOCATION: BLOCKCHAIN AND KYC INTEGRATION

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ABSTRACT

The peer-to-peer variant of digital currency will enable any financial institution seeking regulatory compliance to first undertake a Know Your Customer (KYC) procedure. Blockchain technology has emerged as a new method to enhance the efficiency of the KYC procedure. It offers robust protection against fraudulent activities by ensuring that the KYC process is transparent, secure, and immutable. Blockchain technology has received global acknowledgment for its potential to revolutionize the KYC process. Financial institutions may readily access customer information held on a decentralized network enabled by blockchain technology. Ethereum blockchain technology may enhance the efficiency of financial institutions by significantly reducing the time and costs associated with KYC processes. The objective of this research is to provide a viable and enduring solution to the issues at hand. The proposed strategy entails the central bank maintaining a comprehensive registry of all registered banks and meticulously monitoring their adherence to existing regulations on customer acquisition and KYC compliance.

INTRODUCTION

A distributed ledger maintained by several nodes inside a decentralized network is referred to as a blockchain. A replica of the whole log chain is maintained on each of these nodes. Blockchain technology seems to be disrupting several conventional business practices because to its distinctive characteristics, including decentralization, transparency, resilience, auditability, and security. Although it is an antiquated concept, blockchain has garnered more interest since the advent of Bitcoin. An someone or entity named Satoshi Nakamoto authored an article in 2008 entitled "Bitcoin: A Peer-to-Peer Electronic Cash System," often referred to as the Bitcoin White Paper. The essay proposes using blockchain technology to facilitate the transfer of digital assets without the need of a financial intermediary. The article elaborates extensively on strategies to prevent duplicate spending, a major concern associated with computerized bank transactions. The design of this transportation system is based on blockchain technology, which provides a distributed ledger framework. In the blockchain, each user on the network functions as a node, with node transactions linked inside blocks. Since 2008, three generations of blockchains have been used, after the publishing of Satoshi Nakamoto's white paper on Bitcoin. Cryptocurrency transactions use Blockchain 1.0, financial transactions employ Blockchain 2.0, and applications outside finance, such as government, healthcare, and research, need Blockchain 3.0. Blockchain has several uses within the financial sector. Essential elements include cryptocurrency exchanges, crowdsourcing, sukuks, non-fungible tokens (NFTs), payment systems, and know-your-customer (KYC) protocols. KYC is a procedure often executed by banks on an individual basis. Financial institutions may exchange data and consolidate transactions. Additionally, the KYC process may be conducted with blockchain technology. Advantages of using blockchain technology in the KYC process include enhanced speed, more transparency, and decentralization in customer risk management. Upon using a loan, a bank client is required to make regular repayments to the bank. Banks should assess their risks by exchanging information with other banks on limits, dangers, and collateral. Banks can more rapidly assess the risks associated with their clients if they possess this information. Traditional credit evaluation depends on centralized credit agencies, which collect financial data from banks and later profit by reselling it to financial organizations. This technique raises questions about data ownership and security, since credit bureaus may change the information. Moreover, the data retrieval procedure is often postponed, as it generally transpires toward the end of the day. Conversely, a blockchain-based architecture promotes a decentralized framework whereby all participating institutions own identical copies of consumer financial information. This shared ledger facilitates instant data access for authorized entities, therefore obviating the need for a central middleman and its corresponding costs. Decentralized blockchain technology may substantially enhance the efficacy of KYC procedures. This may be accomplished via many mechanisms: enhanced processing speed, shortened onboarding duration for clients, less risk of fraud and money laundering, and a reduction in overall expenses borne by financial institutions. This paper elucidates the methodology for exchanging limit, risk, and collateral information of bank clients via interbank credit using blockchain technology. A blockchain-based system was developed on the Ethereum network via a smart contract written in the Solidity programming language. Subsequent to granting a loan, the bank inputs the customer's limit, risk, and collateral data into the system. Simultaneously, if the consumer has obtained a loan from a different bank, the bank additionally retrieves the limit, risk, and collateral information provided by that institution. This research, being conducted on a private blockchain network, is not susceptible to Sybil attacks. The writers recognize their contributions to the paper as detailed below:

Study idea and design: B. Karadag, A.H. Zaim, A. Akbulut; model development: B. Karadag, A. Akbulut; analysis and interpretation of findings: B. Karadag, A.H. Zaim, A. Akbulut; manuscript drafting: B. Karadag, A. Akbulut. All authors evaluated the findings and sanctioned the final version of the manuscript.

LITERATURE SURVEY

A review of blockchain approaches for KYC:

Traditional bank KYC is costly and unreliable. Thus, financial firms must embrace new technology to succeed. Blockchain technology is generally acknowledged due to its reliability and security across businesses. This research examines how blockchain technology might improve banking in information tracking, storage, and KYC document verification. A simple KYC approach and a reliable technology like blockchain that can halt fraud and solve scalability and privacy challenges are required today. The study discusses previous studies showing how blockchain technology minimizes intermediaries, reducing the risk of hostile action and errors in human effort.

Bank records storage system through blockchain:

This paper advocates using blockchain technology with storage and encryption systems to protect financial information. Smart contracts manage data sharing and storage, while blockchain technology ensures data security. Only hash values are recorded on the blockchain; genuine bank records are encrypted in a different database. Off-chain records are often linked to blockchain hashed data for security. Digital signatures and document encryption use cryptography. The system's web application interface allows decentralized conversation between transaction participants.

Sybil in the haystack: A comprehensive review of blockchain consensus mechanisms insearch of strong Sybil attack resistance:

Distributed computer systems employ consensus to boost fault tolerance. Research in distributed ledger technology has expanded because to its rapid development following the Bitcoin proposal. Public and permissionless networks need robust leader election systems that can survive Sybil assaults, in which malicious attackers impersonate others to induce Byzantine failures. We want to review all relevant research on Sybil resistance in blockchain systems to find trends and new directions. After a comprehensive literature assessment, we limit 21,799 research records to 483 relevant ones. These systems are categorized by their incentive structure, leader election procedure, and Sybil resistance. Low Sybil resistance techniques use reputation systems or real-world linkages, whereas high-Sybil resistance methods use Proof-of-Work or Proof-of-Stake. We found many unique ways that may reduce system security in conditions with smaller attack surfaces, but only a few core models may endure Sybil assaults in a non-permitted environment.

Exploring the determinants of blockchain acceptance for research data management:

Researchers want to manage their data to improve study results. This study examines the use of blockchain-based electronic lab notebooks for research data management. The research model was based on the technological acceptance concept. The sample included 585 Korean university and research institute researchers. The research found that utility and usability increased utilization and lowered perceived risks. Additionally, social norms increased use intention and lowered perceived danger. Management should reduce technology risks while implementing blockchain-based services, according to the report. They should also make blockchain-based services easy to use and recommend to neighboring users.

Bitcoin: A Peer-to-Peer Electronic Cash System:

A completely peer-to-peer form of electronic currency enables direct transmission of online payments between parties, bypassing banking institutions. Digital signatures provide a partial answer; nonetheless, the need of a trusted third party to avert duplicate spending results in the forfeiture of significant benefits. We recommend using a peer-to-peer network to address the double spending problem. A hashing technique is used by the network to date transactions into an uninterrupted hash-based proof-of-work chain, creating a record that cannot be modified without redoing the proof-of-work. Moreover, the longest chain not only provides evidence of the events it saw but also indicates that it was generated by the most powerful CPU. The longest chain will be established, and it will endure beyond the attackers, provided that the bulk of CPU power is held by nodes that do not collaborate to compromise the network. Minimal architecture is required for the network itself. Nodes may join or leave the network at any moment, using the longest proof-of-work chain as verification of their absence. Messages are conveyed with optimal effort.

A review on blockchain applications in fintech ecosystem:

Through the 1990s, the term "fintech" became more well-known. Fintech has become its own business, especially since 2004. This is because so many people use the internet and technology is changing so quickly. In the last few years, Fintech has led to many improvements in ATMs, credit and debit cards, mobile payments, internet banking, and the infrastructure and operations for digital banking. The word "blockchain" has been used a lot since the rise of Bitcoin in 2008. Fintech and blockchain technology have also met. Decentralization was made possible by the blockchain's spread ledger structure. This meant that Bitcoin could be sent without going through a middleman. The rise of cryptocurrencies like Ethereum after Bitcoin made it possible to build a system around these transfers. Not only are customizable blockchain platforms used for financial transactions, but they are also being used in education, healthcare, supply chains, insurance, and healthcare. A number of academic studies look into applications that are related to these areas. For business, there isn't a study that goes over all of them at once, though. For this study, blockchain uses in the banking industry were looked at and put together in one study. It was specifically said what kind of business used it and how big the market was. Also talked about were possible future uses for blockchain technology.

PROJECT DESCRIPTION

The project intends to solve the inherent inefficiencies and security flaws of conventional KYC procedures in banking by creating and implementing a blockchain-based Know Your Customer (KYC) model. Conventional KYC processes, which are usually handled independently by each bank, sometimes include security issues, lengthy processing times, and redundancies. This project aims to provide a decentralized, trustworthy status that increases the speed and effectiveness of KYC procedures by using blockchain technology. By facilitating instantaneous data interchange between banks and enabling real-time risk assessment, the blockchain-based approach will eliminate the delays that come with end-of-day transactions. The openness and immutability of blockchain technology will aid in preventing fraud and safeguarding data integrity.

REQUIREMENT ENGINEERING

A highly accurate and predictive recommendation system can lead to very efficient productivity. Here is an efficient recommendation system with good productivity that results in valuable process for users.

HARDWARE REQUIREMENTS

Hardware requirements should be a comprehensive and uniform specification for the entire system since they might be the foundation of a contract for system implementation. Software engineers utilize them as a foundation for system design. They ought to focus on the functions of the system rather than its implementation.

HARDWARE

- PROCESSOR : Intel i7.
- RAM : 8GB RAM
- MONITOR : 15” COLOR
- HARD DISK : 1 TB

SOFTWARE REQUIREMENTS

A software requirements document serves as a system definition. A description and characterization of the needs ought to be part of it. It outlines what the system ought to do, not how. The foundation for developing software requirements specifications is provided by software requirements. During a development activity, it is helpful for cost estimation, team activity planning, task execution, team monitoring, and team progress tracking.

- Front End : J2EE (JSP, SERVLET)
- Back End :

MY SQL 5.5

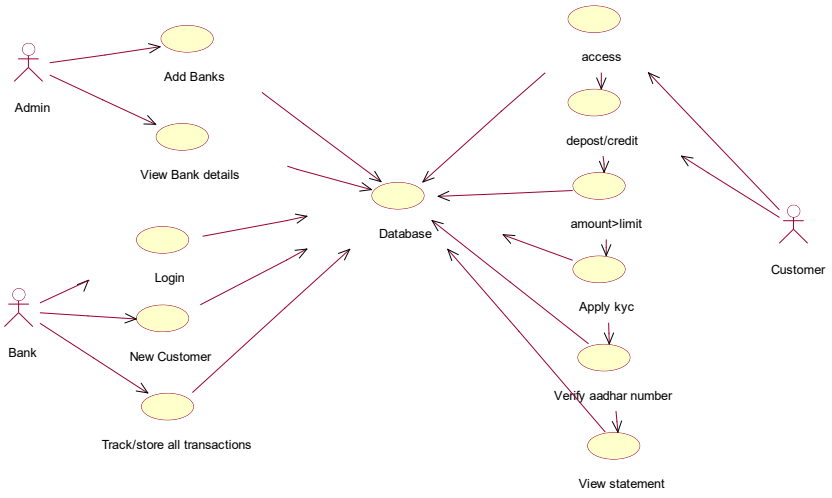
- Operating System : Windows 10/11
- IDE : Eclipse

DESIGN ENGINEERING

To execute the project, create engineering processes using several UML (Unified Modeling Language) diagrams. Design is an essential technical representation of the final product. The transformation of requirements into a software representation is referred to as software design. In software engineering, quality is achieved via design. The process of accurately transforming customer requirements into a completed product is termed design.

Use Case Diagram

Fig: 5.1.1 Use Case Diagram



System Architecture

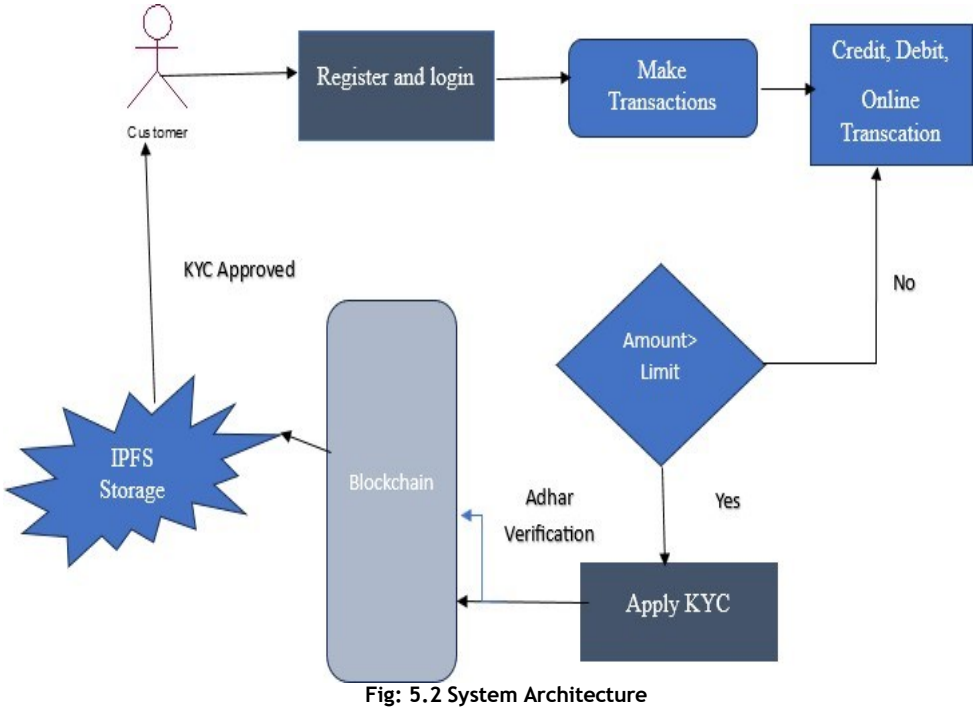


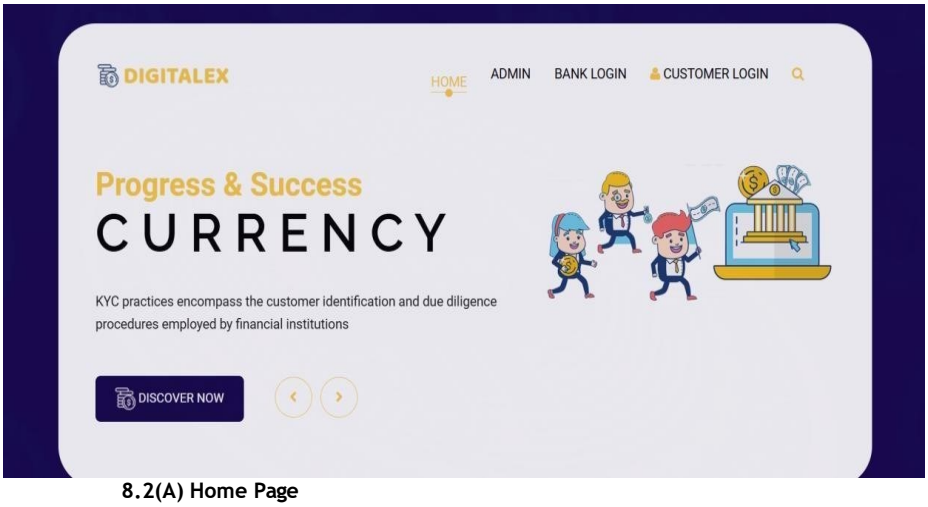
Fig: 5.2 System Architecture

EXPLANATION:
KYC practices include the identification and due diligence processes used by financial organizations. These methods seek to develop a thorough understanding of the customer's identification, risk profile, and financial transactions. By collecting and scrutinizing this data, institutions can proficiently mitigate possible risks linked to money laundering, terrorism funding, and other financial offenses. Moreover, an effective KYC procedure enables customized service configurations that optimally align with the customer's requirements. Blockchain has several benefits for creating a cohesive platform for safe KYC data storage. The use of blockchain technology gives a promising potential for the safe and transparent storage and interchange of credit allocation data in the financial industry. This distributed ledger system promotes confidence and transparency among all players in the credit allocation process, including banks, borrowers, and other pertinent parties. Moreover, blockchain technology may substantially improve the efficiency of credit allocation processes. By using this technology in credit attribution data, banks may optimize the verification and validation of borrower information, hence decreasing the time and expenses linked to conventional human procedures.

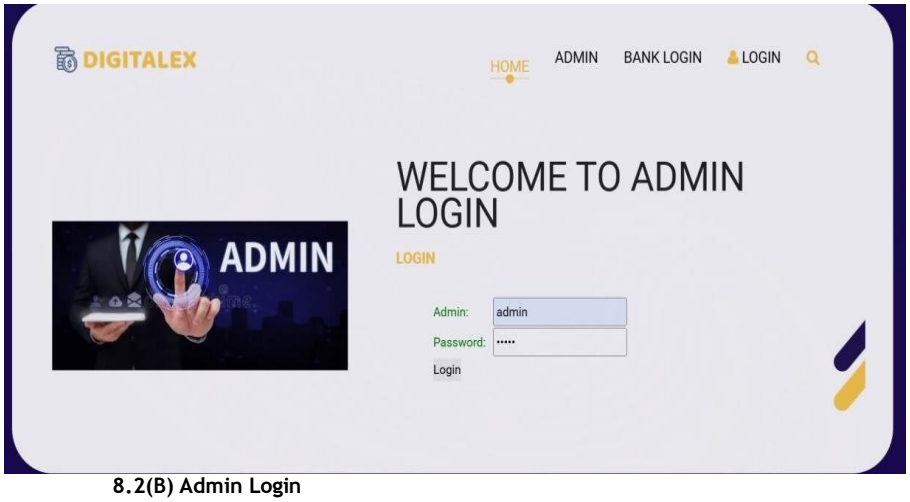
DEVELOPMENT TOOLS
Java is the platform being utilized here, and the main languages are Java, J2EE, and J2ME. J2EE has been chosen for implementation in this project. This chapter covers the software language and tools used to build the project.

THE JAVA FRAMEWORK
Java, a fundamental component of Sun Microsystems' platform, is a programming language first developed by James Gosling at Microsystems and introduced in 1995. Despite having fewer low-level capabilities and a more simplistic object model, the language significantly derives its grammar from C and C++. Any Java Virtual Machine (JVM), irrespective of computer architecture, may execute Java applications since they are often compiled into bytecode. Java is a class-based, object-oriented, concurrent, general-purpose language designed to minimize implementation dependencies. Application developers will be able to "write once, run everywhere" due to its architecture. Java is extensively used in online applications and software development, and it is regarded by many as one of the most significant programming languages of the 20th century. The Java Framework is an innovative, platform-agnostic framework that simplifies the development of online applications. Java is the optimal technology for networked computing due to its efficiency, security, platform compatibility, and adaptability. Java is used across a wide range of devices, including laptops, data centers, gaming consoles, scientific supercomputers, mobile phones, and the Internet.

SNAPSHOTS
Using COREJAVA, this project is constructed as a web application. SOCKET and SERVERSOCKET are used to manage the server process, while Cascading Style Sheet is used for the design portion.

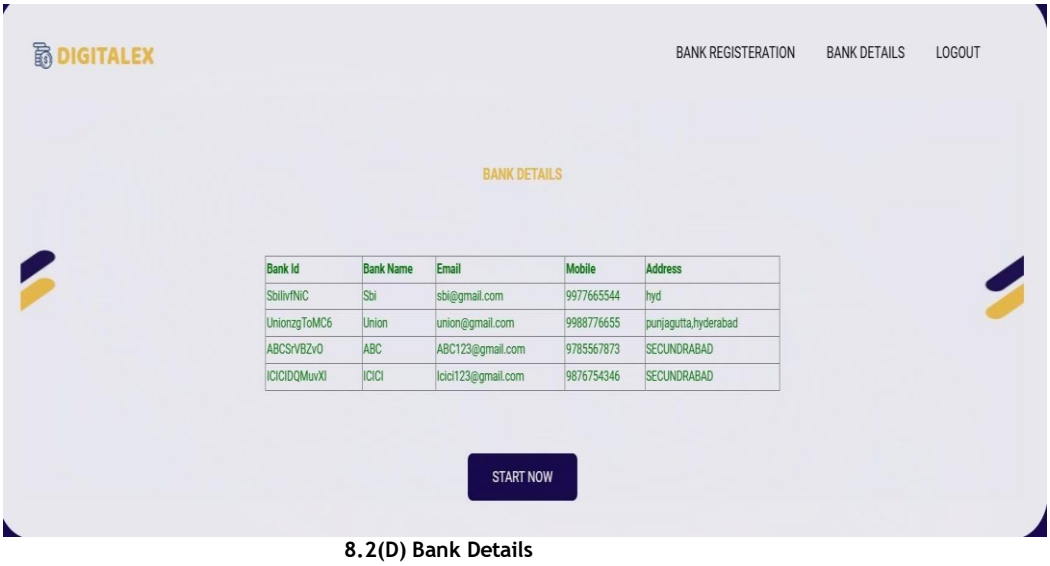


8.2(A) Home Page

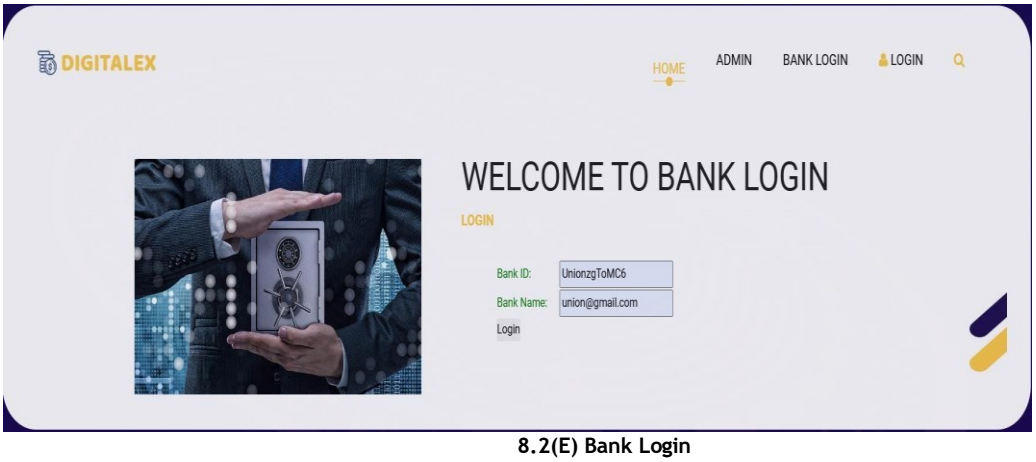


8.2(B) Admin Login

8.2(C) Bank Registratio

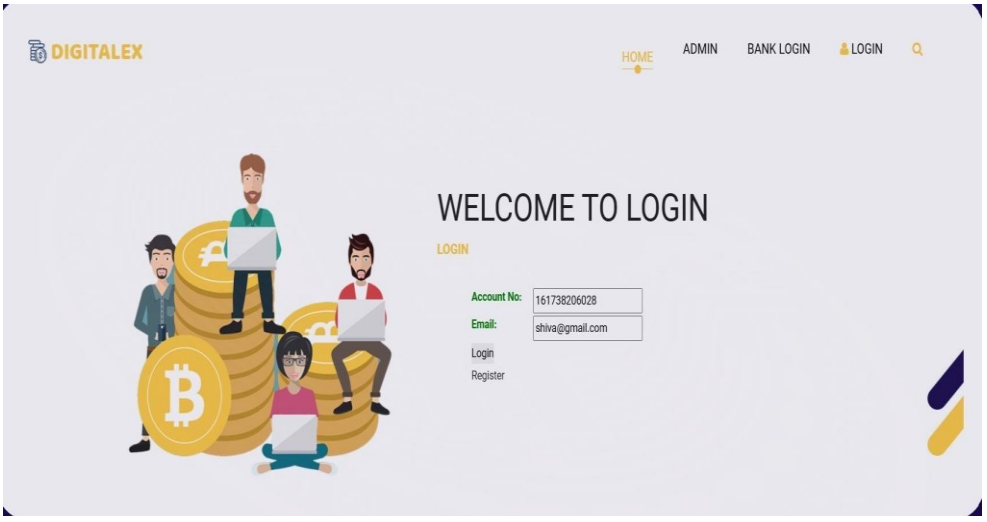


8.2(D) Bank Details

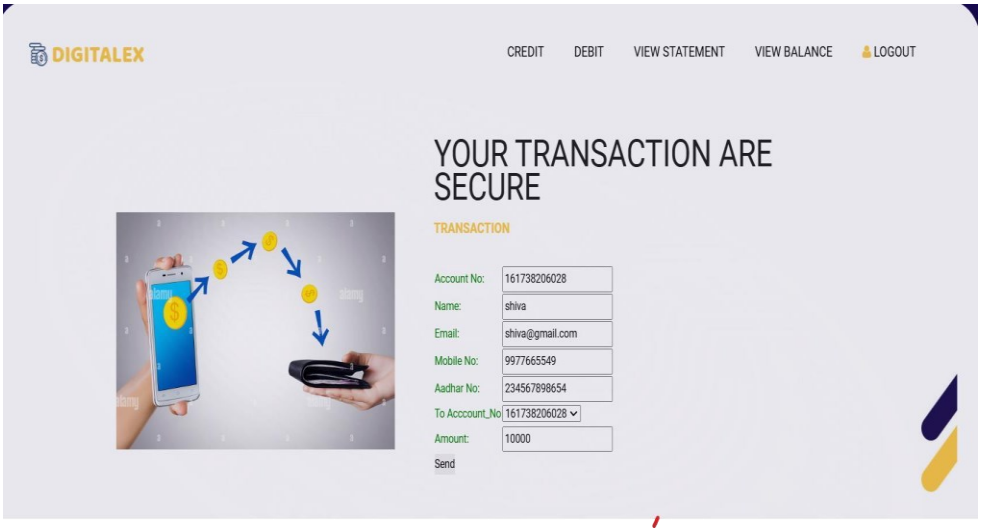


8.2(E) Bank Login

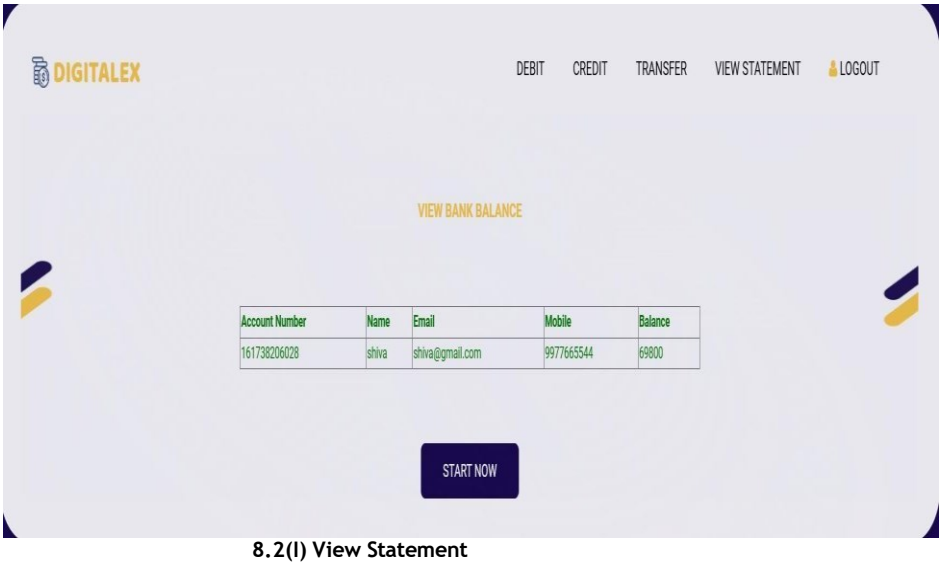
8.2(F)Customer Information



8.2(G) Customer Login



8.2(H) Online Transaction



8.2(I) View Statement

SOFTWARE TESTING

The objective of testing is to identify mistakes. The endeavor to identify every possible fault or defect in a work product is termed testing. It verifies that components, subassemblies, assemblies, and/or the final product function as intended. The process of deploying software to ensure the system meets user requirements and functions without unacceptable malfunctions. There are several types of assessments. Each kind of testing addresses a certain testing need.

FUTURE ENHANCEMENT

Future advancements in the KYC process with blockchain technology will likely emphasize on regulatory compliance and broadening its integration across other financial operations. As blockchain systems progress, they will include sophisticated cryptographic methods and smart contracts to enhance security and simplify compliance procedures. The use of non-fungible tokens (NFTs) to tokenize and oversee Letters of Guarantee (LOGs) [24] will improve their legitimacy and mitigate the danger of fraud. Furthermore, enhanced cooperation between financial institutions and regulatory bodies would facilitate the resolution of current legal and compliance issues, hence making blockchain-based KYC solutions more widely accepted and efficient. These innovations seek to establish a more safe, efficient, and collaborative financial ecosystem.

CONCLUSION

The KYC model, based on blockchain technology, is developed using the Ethereum private network and Proof of Stake consensus mechanism as its foundation. Thus, blockchain technology provides a revolutionary remedy for the deficiencies of conventional KYC in banking. A permanent shared ledger streamlines the onboarding process, enhances data security, and facilitates real-time risk evaluation. Regulatory obstacles persist; nonetheless, the capacity to enhance efficiency, cooperation, and risk management within a safe and transparent framework is indisputable. As blockchain advances and laws develop, it has the capacity to transform KYC, initiating a new epoch of safe and efficient client identification in banking.

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