Decentralized Loan Management System Using Blockchain

Pranav Pagare[1], Raj Pagare[2], Yash Pund[3], Durvankur Bhalerao[4], Prof. Dr. R. S. Khule[5]

Students, Department of Information Technology[1,2,3,4]

Professor, Department of Information Technology[5]

Matoshri College of Engineering and Research Center, Nashik, Maharashtra, India

Abstract: *The most shocking events were the recent discovery of the fraudulent activities in the Punjab National Bank. This is due to frequent systemic failures that detect human errors. Block chain technology is the greatest solution for this issue. It is surprisingly common for the information settlement mechanism like SWIFT to be on a isolated ledger from the payment settlement mechanism. If the banks use a ledger that stores information settlement distributed across all the participants, then the fraudulent user may reflect on all the available participants in the transactions, auditors and regulators. Our Paper is a Decentralized Loan Management System built on Ethereum block chain which targets on preventing such fraudulent attacks on Loans sanctions by decentralizing the processes. The security features authentication of the user identity, authentication of bank officials and multiple levels of verification of details are implemented using Public Key Infrastructure (PKI)*

Keywords: Block Chain, Loan Management System, User Privacy, Smart Contracts

I. INTRODUCTION

In the current financial landscape, traditional loan management systems are often characterized by centralized control, leading to issues such as limited transparency, susceptibility to fraud, and inefficiencies in the loan origination and approval processes. Additionally, borrowers may face challenges related to privacy, as their sensitive financial information is typically stored in centralized databases, making it vulnerable to data breaches. The objective of this project is to address these issues by developing a decentralized loan management system utilizing blockchain technology.

This system aims to provide increased transparency, security, and efficiency in the loan lifecycle, from application and approval to repayment, while also enhancing borrower privacy. The project will explore the design and implementation of smart contracts, decentralized identity verification, and secure data storage on a blockchain platform to revolutionize the way loans are managed and transacted, ultimately benefiting both lenders and borrowers in a more secure, transparent, and cost-effective manner.

This program is called loan management program. This approach is intended to simply preserve the details of the direct lenders. This method is created to keep records about consumers who have taken out bank loans. A registered user can sign in to the Loan system using their email id or user id and password. After logging in to this process there are decisions to add new customers, manage old customer account and check other details etc. Many new customers are visiting this bank, so adding new customer information and keeping records is very easy to use.

There are many other ways like changing the repo rate, adding new accounts etc. New and unique ids are provided to everyone who subscribes in this way and to their borrowers. There are decisions to evaluate the customer's loan amount, rate and unpaid amount. The amount paid by any customer or can be kept there and it is easy to calculate daily how much money is collected. Bank employees are a type of manager; the cashier can also assess their customer's key points if any customer has not paid a monthly instalment for the past three months. It's easy to calculate money with a hosting account every month. this method also has the option of running a backup, which means that if we back up the database it will never be lost. It can even take away the working class and can even manage their account for wages. An employee may have taken out a loan that the bank may appear to have. Therefore, this whole loan management system can be the solution to all of the issues we face in the industry at large.

II. LITERATURE SURVEY

Jiin-Chiou Chen, Narn-Yih Lee, Chien Chi, and Yi-Hua Chen **"Blockchain and Smart Contract for Digital Certificate" [1]** In order to solve the problem of counterfeiting certificates, the digital certificate system based on blockchain technology would be proposed. By the unmodifiable property of blockchain, the digital certificate with anti-counterfeit and verifiability could be made. The procedure of issuing the digital certificate in this system is as follows. First, generate the electronic file of a paper certificate accompanying other related data into the database, meanwhile calculate the electronic file for its hash value. Finally, store the hash value into the block in the chain system. The system will create a related QR-code and inquiry string code to affix to the paper certificate. It will provide the demand unit to verify the authenticity of the paper certificate through mobile phone scanning or website inquiries. Through the unmodifiable properties of the blockchain, the system not only enhances the credibility of various paper-based certificates, but also electronically reduces the loss risks of various types of certificates.

Austin Draper, Aryan Familrouhani, Devin Cao, Tevisophea Heng, Wenlin Han **"Security Applications and Challenges in Blockchain" [2]** Blockchain technology is a highly popular yet highly misunderstood concept that is used today and in future applications. To enhance security and privacy, many applications adopt Blockchain. However, there are intrinsic drawbacks and emerging challenges. In this paper, we study popular security applications in Blockchain, present their major problems, as well as other challenges in Blockchain which allows future research to be conducted more efficiently.

Marco Baldi, Franco Chiaraluce, Emanuele Frontoni, Giuseppe Gottardi, Daniele Sciarroni and Luca Spalazzi Certificate **"Validation through Public Ledgers and Blockchain" [3]** Public key infrastructures (PKIs) are of crucial importance for the life of online services relying on certificate-based authentication, like e-commerce, e-government, online banking, as well as e-mail, social networking, cloud services and many others. One of the main points of failure of modern PKIs concerns reliability and security of certificate revocation lists, that must be available and authentic any time a certificate is used. Classically, the CRL for a set of certificates is maintained by the same (and sole) certification authority (CA) that issued the certificates, and this introduces a single POF in the system. We address this issue by proposing a solution in which multiple CAs share a public, decentralized and robust ledger where CRLs are collected. For this purpose, we consider the model of public ledgers based on blockchain, introduced for the use in cryptocurrencies, that is becoming a widespread solution for many online applications with stringent security and reliability requirements.

Santosh Pandey, Gopal ojha, Rohit Kumar and Bikesh Shresha**"BlockSIM: A practical simulation tool for optimal network design, stability and planning" [4]** In this paper we introduce BlockSIM, a comprehensive and open source blockchain system simulation tool which can assist blockchain architects better evaluate the performance of planned private blockchain networks by running scenarios and decide the optimal system parameters suited for their purposes. We compare the results of our simulation with real blockchain networks and demonstrate that BlockSIM can be used effectively by architects of blockchain systems to plan and implement scalable, stable and resilient blockchain networks. Finally, we demonstrate via a real life example how architects can apply BlockSIM to plan and design real-world blockchain systems.

Christopher Ehmke,Florian Wessling and Christoph M. Friedrich**"Proof-of-Property - A Lightweight and Scalable Blockchain Protocol" [5]** The approach proposed in this paper is based on the idea of Ethereum to keep the state of the system explicitly in the current block but further pursues this by including the relevant part of the current system state in new transactions as well. This enables other participants to validate incoming transactions without having to download the whole blockchain initially. Following this idea use cases can be supported that require scalable blockchain technology but not necessarily an indefinite and complete transaction history.

III. PROBLEM STATEMENT

Providing a loan should be a simple process. One should check the client's eligibility to get the loan and then approve or deny the loan. Once approved, the customer should receive the funds. However, in traditional systems, this process is often chaotic for valid reasons. As the customer base increases, servicing loans becomes complex.

Every customer has different terms and payment dates. Loan management systems help automate the entire loan lifecycle.A blockchain offers different protocol networks so the development of the blockchain and its transactions do

not interfere with live transactions. These networks are used to develop, test, and deploy smart contracts and other transactions.

Our Loan Management System based on blockchain with smart contract securely shares the details about transactions by organizing the network, this action prevents fraud in the system. In cirrus's core wallet, the admin creates an account for each user and updates the wallet information in their profile and the transaction is done using the Cirrus API.

IV. OBJECTIVES OF PROJECT

Following are the objectives of the project:

- To design and develop a system for dynamic and secure Loan Management system using smart contract in blockchain environment.
- To design own blockchain in open source environment with custom mining strategy as well as smart contract.
- To validate and explore system performance using consensus algorithm for proof of validation.

V. MOTIVATION

The motivation behind the project "Decentralized Loan Management System Using Blockchain" is rooted in the imperative need for a more transparent, efficient, and inclusive loan management system. Conventional loan processes are often marred by opacity, the involvement of numerous intermediaries, and vulnerabilities to fraud or data manipulation. Blockchain technology offers an ideal solution, providing a transparent and immutable ledger to record loan transactions, instilling trust and confidence among borrowers and lenders. This enhanced transparency not only simplifies the loan process but also lowers the risk of disputes, ultimately benefiting all parties involved.

Moreover, the motivation for this project extends to the prospect of reducing the complexity and costs associated with traditional loan management. By diminishing the reliance on multiple intermediaries, the project aims to streamline the lending and borrowing process, potentially reducing costs and making financial services more accessible. The adoption of blockchain facilitates the use of smart contracts, enabling automated and self-executing loan agreements, which significantly reduces the need for manual intervention and enforces loan terms impartially. With blockchain's ability to secure data and verify identities, this project seeks to make lending more efficient and inclusive, offering a pathway to financial inclusion for underserved regions and demographics.

VI. PROPOSED SYSTEM
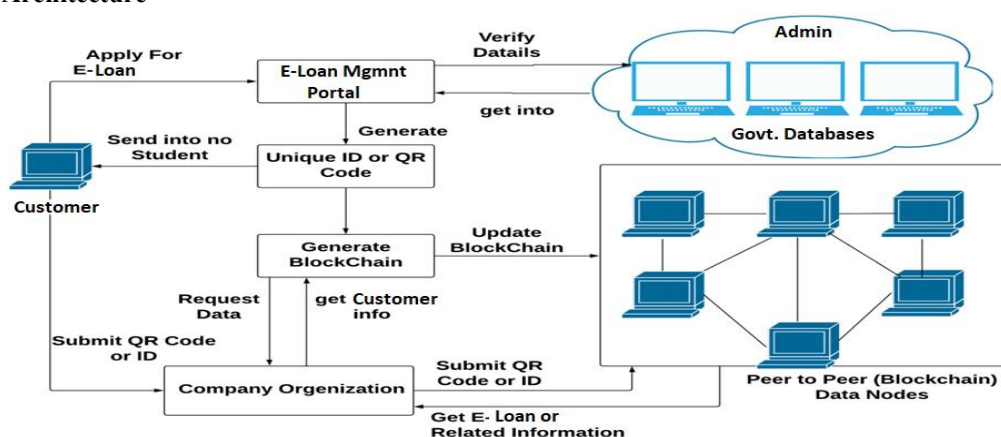
A. System Architecture

Fig. 1. System Architecture

B. Proposed System

In this project, we have demonstrated a loan management system based on blockchain namely DApp. In real-time, the system securely shares the details about transactions by organizing the network, this action prevents the frauds in the system. Our proposed system maintains the privacy of the valuable customers by eliminating the attackers or frauds

who injecting vulnerable data. By our proposed system, the banks in India can be completely digitalized without any hesitation from the hackers and the attackers. Thus, the integration of blockchain in the loan management system incorporates easier, faster, and cheaper solutions, which can be adapted by the existing banking systems for experiencing the high-level security and privacy.

The proposed system for the project is designed to revolutionize the way loans are originated, managed, and accessed. It leverages blockchain technology to create a secure, transparent, and efficient platform that benefits both borrowers and lenders. Here are the key components of the proposed system:

Blockchain Ledger: The core of the system is a blockchain ledger that records all loan transactions. This ledger is immutable, transparent, and distributed across a network of nodes, ensuring data integrity and security. Every loan agreement, repayment, and related transaction is permanently recorded on the blockchain.

Smart Contracts: Smart contracts are utilized to automate and enforce loan agreements. These contracts self-execute based on predefined conditions, eliminating the need for intermediaries and ensuring that loan terms are consistently upheld.

Identity Verification: The system incorporates robust identity verification and credit history tracking through blockchain. This enhances the accuracy of lending decisions and reduces the risk of loan defaults.

Borrower and Lender Portals: The proposed system features user-friendly borrower and lender portals. Borrowers can apply for loans, submit required documents, and track their loan status. Lenders can review loan applications, assess creditworthiness, and manage loan portfolios.

Cross-Border Accessibility: The system facilitates cross-border lending and borrowing, breaking down geographical barriers. Borrowers and lenders can connect globally, increasing access to financial services for underserved regions and populations.

Data Privacy and Security: Privacy and security are paramount. The system ensures that sensitive borrower information is protected, and data remains confidential and tamper-proof.

Decentralized Network: The decentralized nature of the blockchain network enhances disaster recovery and system resilience. Loan data is distributed across multiple nodes, reducing the risk of data loss.

VII. CONCLUSION

In conclusion, an online loan management system is a vital tool for lenders and financial institutions to efficiently and effectively handle the loan life cycle, from application and approval to disbursement and repayment. It offers numerous benefits such as streamlined processes, improved customer experience, reduced operational costs, and enhanced risk management. Predictive analytics and risk management capabilities will continue to evolve, enabling lenders to make informed decisions and proactively manage risks. Personalization of loan products and customer experiences will be a focus, leveraging data analysis to tailor offerings to individual borrowers. Integration with ecosystem partners and block chain technology are expected to further enhance efficiency, transparency, and collaboration in the lending process.

VIII. ACKNOWLEDGMENT

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