WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Decentralized Borrow and Lending of Crypto Assets

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ABSTRACT:

The goal of this project is to create a decentralised finance platform where users can lend and borrow cryptocurrencies with incentives based on their credit scores. People who have been denied access to finance by conventional institutions have turned to decentralised finance as an alternative. Financial frameworks. However, the present Defi protocols do not distinguish between customers with solid credit histories and those without. So, one may assess a person's reputation based on their credit histories. Establish lending pools for fungible cryptocurrency assets that enable fast lending and borrowing, and give members reputations based on their spending and saving habits. We research the leading ethereum lending platforms, their architecture, and how they operate in order to create customised loan pools with additional incentives for users with greater reputation. They serve as the foundation for the system we suggest, which upholds user reputation based on financial behaviour and rewards users with solid credit histories.

Keywords: Blockchain, Ethereum, lending pools, and decentralized finace

1. INTRODUCTION

A hash chain of blocks that functions over a peer-to-peer (P2P) network forms the basis of a blockchain. A transaction that records things like wealth transfers is represented by a block, which is a time-stamped data structure. A P2P network is made up of a number of computers that individually offer access to resources and information. A user must submit her digitally signed transactions across her P2P network in order to transfer assets. These transactions are gathered by other users known as miners, who then add them to blocks and upload the blocks to the blockchain. The entire network adheres to a consensus methodology that enables sincere participants to concur on the actual blockchain version. Blockchain-based Decentralized Finance (DeFi) is a developing financial technology that is comparable to that utilised in cryptocurrencies. DeFi refers to a broad range of universally accessible financial goods and services. As a result of being controlled by code that anybody can view and audit, services that formerly had poor response times and a danger of human mistake now operate automatically and with greater security. 4,444 banks and institutions no longer have access to their funds, financial goods, or financial services because of the system. The security protocols, connection, software, and hardware innovations used by his peer-to-peer finance network enable this.Through the use of a variable rate borrowing protocol, this research developed a DeFi protocol that keeps track of a user's credit score. The protocol produces and maintains an on-chain credit score by keeping track of each credit pool user's financial behaviour.

1.2 Motivation

Due to its recent development, the DeFi area has a lot of possibility for improvement through the use of current solutions or the adaptation of conventional ideas to brand-new decentralised marketplaces. We checked for DeFi's current flaws and discovered the following:

In the current DeFi protocols, lending and borrowing are subject to the same rules or conditions for all users. Users with a solid track record who kept their positions in an ideal state without ever defaulting are not rewarded with incentives or benefits.The lack of a method to determine a user's trustworthiness also raises some security issues. This is so that a new user can enjoy the same features as an existing user who has a lengthy history of good behaviour, such as borrowing power. However, a novice user is more likely to make a mistake than a skilled expert user. Therefore, a user's level of trustworthiness could be used to identify them and provide them things that are acceptable (like borrowing power).

With all the technical terminology, the current Defi protocols appear to be too difficult for novice users to employ. To improve the widespread acceptance of Defi, a system with an intuitive user interface is required.

1.3 Objectives

To give individuals instant, continuous access so they may lend or borrow cryptocurrency.

To create a decentralised server for users without utilising a bank's server.

To maintain tabs on customers with strong credit records and reward them

1.4 SCOPE

The objectives of this project is to create a lending pool where members can lend and borrow cryptocurrency. In its lending pool, the Defi protocol keeps track of each user's financial transaction and generates and updates an on-chain credit score. The users is more reliable and receives more benefits the better their credit score.

2. Literature Survey

2.1 Decentralized Finance

DeFi provides innovative characteristics not available in conventional finance, such as: The majority of DeFi protocols are based on conventional financial services but necessitate a logical redesign. For instance, the limited processing capacity of the blockchain makes it wasteful to employ a limit order book with a matching engine that has been used by centralised exchanges for decades. Due to this, he developed the automated market maker, which allows traders to engage solely with a pool of assets that have been reserved in a smart contract rather than other traders.

2.2 AAVE

As part of AAVE, lenders deposit cryptocurrency into a pool contract with different reserves in order to provide liquidity (each contained within). The same contract also permits borrowing of pooled funds in exchange for collateral deposits. Loans are based on pooled funds, borrowed amounts, and their collateral rather than needing to be individually reconciled. This enables immediate loans with features determined by the pool's current status. Algorithms are used to determine interest rates for both borrowers and lenders.

According to the cash cost for borrowers (the amount of funds available in the pool at a given point in time). As money is borrowed from the pool, the amount of available money falls and interest rates climb.

It depends on the cash cost for potential borrowers (the amount of funds available in the pool at a given point in time). The money supply is reduced and interest rates rise as money is borrowed from the pool.

2.3 Credit Score

Although lending is dangerous, it is a significant source of income for banks. Lenders use a scale called a credit score to determine a person's creditworthiness. This suggests that this person will probably pay the debt in a timely manner. Credit ratings evaluate who is more trustworthy on a common scale, which

makes lending quicker, safer, and more equitable. Fair Isaac Corporation provides the most prevalent credit rating utilised by lenders (FICO). Some credit bureaus are in charge of calculating FICO scores. Depending on the data these offices have available, the results they award may differ. These ratings are extremely unstable and frequently fluctuate. according to most recent credit history. The data sources are very constrained, yet the results are equivalent to the information presented. In addition to his few data sources, the user's data is at risk of data theft because all of it is stored on his Internet. This demands a safe platform for data storage. This need is satisfied by blockchain technology. A block with timestamped data is created by the blockchain that cannot be altered. Each data block is kept in an ongoing public ledger. This guarantees accountability for all actions and protects everyone's right to privacy.

2.4 Blockchain Oracle

Blockchain oracles are unbiased services that link contracts to the outside world, mainly providing them with information from the outside world and vice versa. Multiple sources are combined with information from around the global to provide distributed knowledge. Oracle is the layer that retrieves data from external data sources, verifies it, authenticates it, and relays it. This is often done through trusted APIs, exclusive enterprise data feeds, and Internet of Things feeds. Prices, completed payments, sensor-measured temperature, election results, etc. are a few examples, election results, etc. are a few examples of data that Oracle sends to smart contracts(any online data source).

3. Requirement Specification and Analysis

3.1 Problem Definition

To develop a decentralized finance web application in which user will be able to lend and borrow crypto assets crypto assets maintaining the credit of each user.

3.2 Objectives

The Objectives of the project are mentioned below\

-To provide users a fast and uninterrupted access to lend or borrow the crypto assets.

-To build a decentralized server for user where no bank's server is involved.

-To keep track of users whose financial records are good and give incentives to them.

3.3 SCOPE

The scope of this project will cover to build a lending pool where users will be able to lend and borrow crypto assets. The DeFi protocol tracks every user's financial activities in its lending pool and calculates/maintains an on-chain credit score. The higher the credit score, the more trustworthy the user is and more benefits the user gets. PICT,Pune 2 Dept. of Information Technology.

3.4 Proposed Methodology

We propose a decentralized lending and borrowing protocol that calculates and maintains a credit score for its users. The protocol offers variable interest rates for both depositors and borrowers depending on supply and demand. The users with higher credit scores are rewarded with higher borrowing power. The system also issues on-chain credit cards which are NFTs. The credit card can be used for easy external payments. The appearance and properties of the credit card change depending on the user's credit score.

3.5 Project Requirements

3.5.1 Hardware Requirements

1. CPU (Quad Core Processor)

2. RAM (8GB)

3.5.2 Software Requirements

1. 64 bit WindowsIDE(Visual Studio Code) : VS Code is mandatory on the system to build the code , club the modules and test the code.

2. Solidity : Solidity is a programming language designed for developing smart contracts which we will need in this project.

3. Web application(ReactJS): React is needed to build the UI of the web application.

3.6 Project Plan

3.6.1 Project Resources

Resources used for implementation of the problem statement are as below:

- Blockchain based documentations
- Visual Studio Code
- AAVE docs
- Solidity Language articles
- React JS documentation

3.6.2 Module Split-up

Our Project is mainly divided 4 modules, Details of project modules are given below.

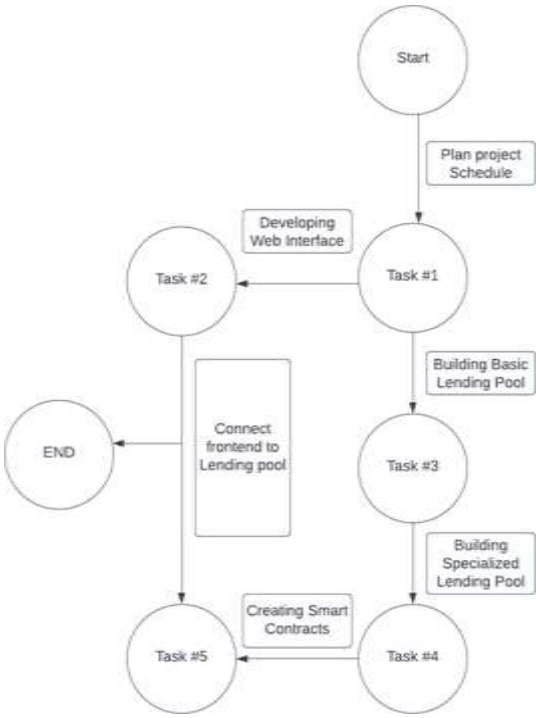
Building the Front-end UI of the web application - A simple UI will be built of this DeFi application using React JS.

Smart Contracts - This module is concerned with building all the necessary smart contracts in the lending pool.

Lending Pools - In this module, 2 Lending pools will be built. In which user will be able to deposit and borrow the crypto assets.

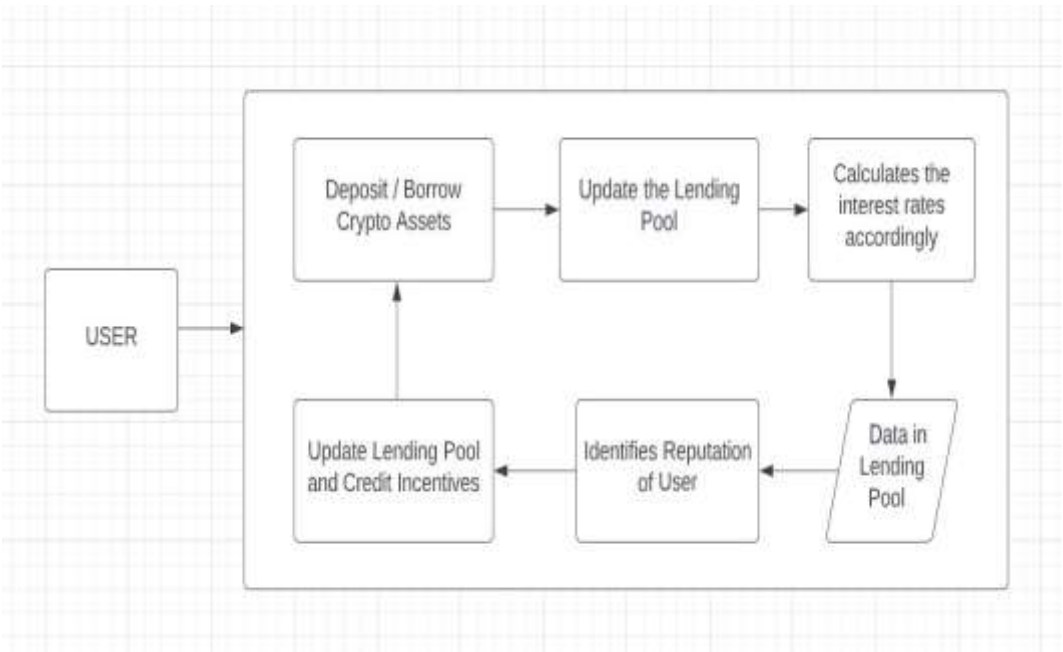
API - In this module, connection will be established between front-end and lending pools via decentralized storage.

3.6.4 PERT Diagram



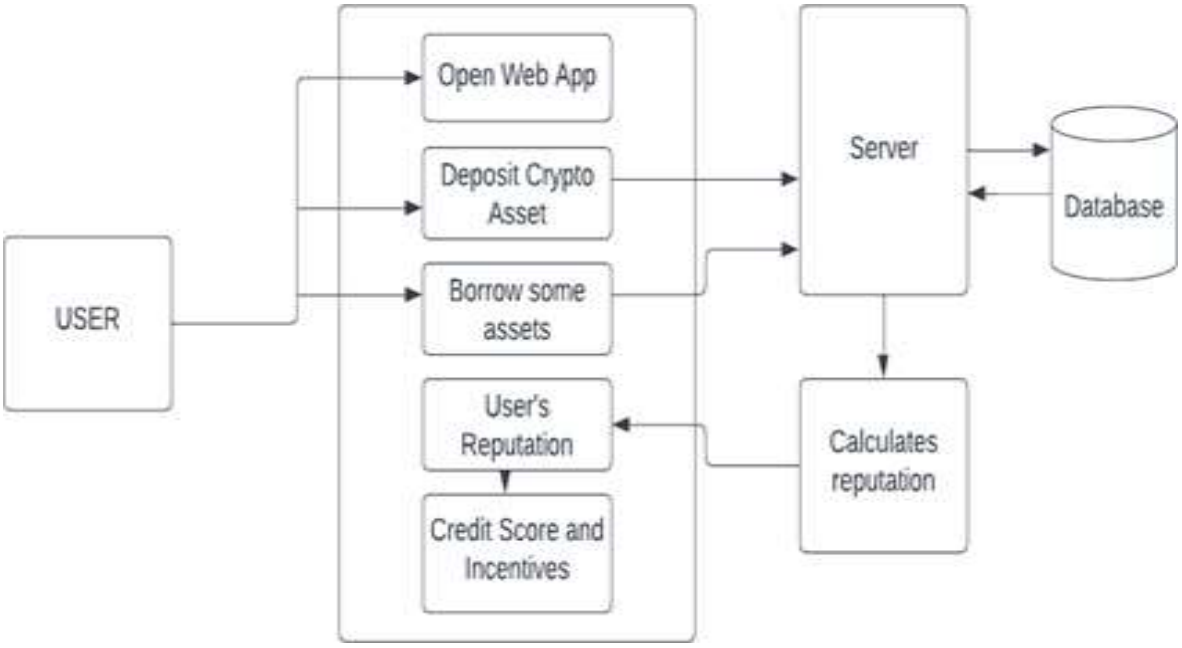
4. System Analysis and Design

4.1 System Architecture

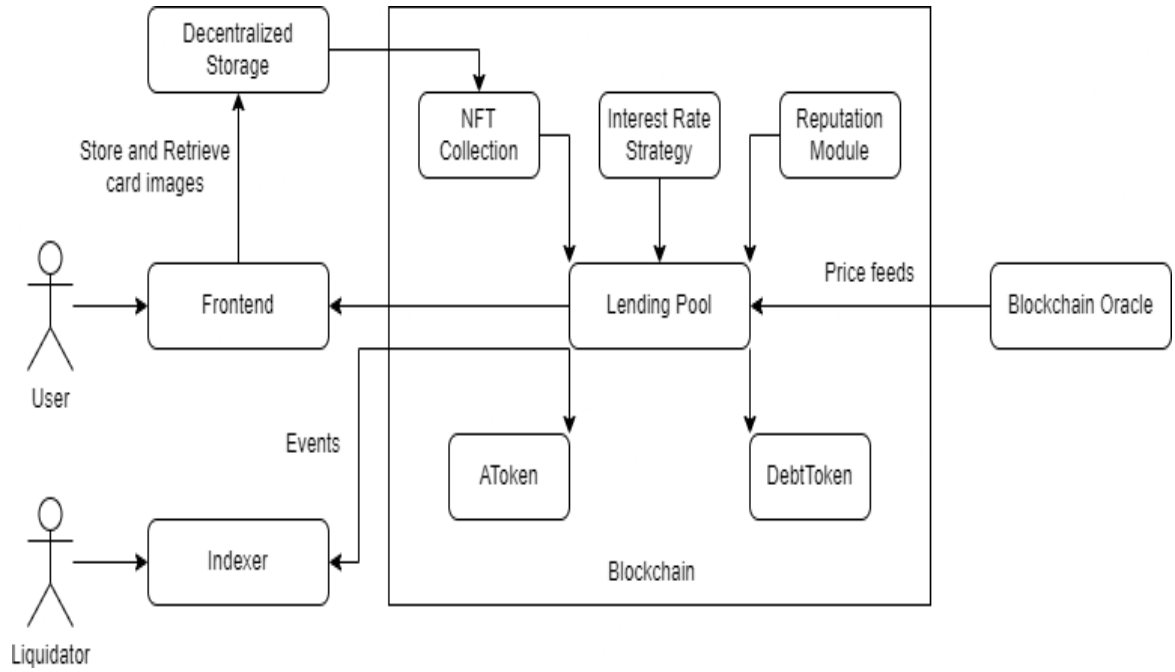


4.2 Necessary UML Diagrams

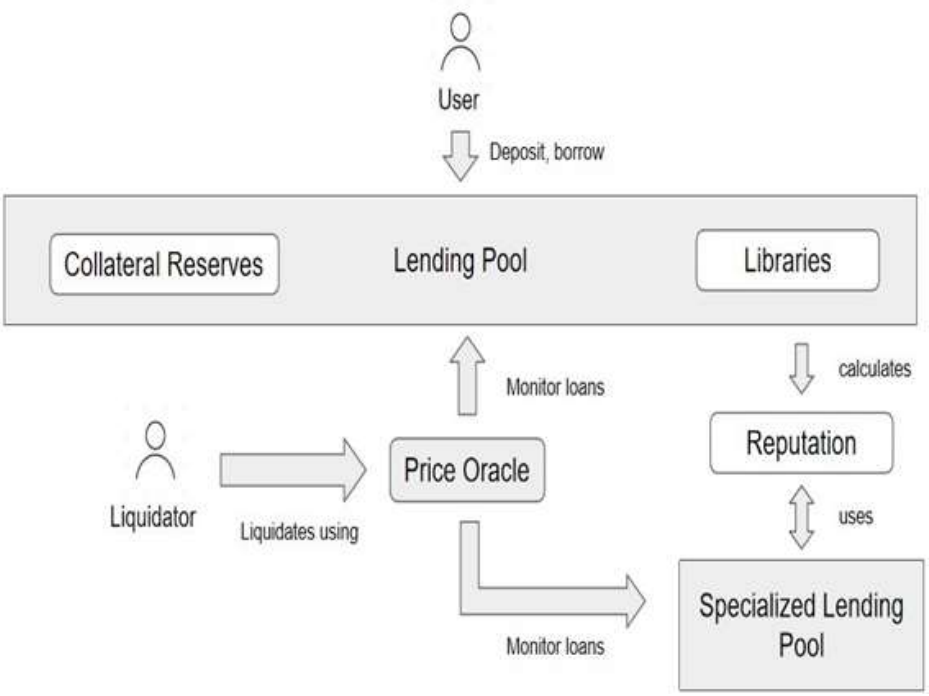
4.2.1 Use Case Diagram



4.2.2 Data Flow Diagram



4.3 Sequence Diagram



4.4 Algorithm and Methodologies

AAVE Protocol

The Aave protocol for decentralised finance (DeFi) enables lending and borrowing of cryptocurrencies and real-world assets (RWAs) without the need for a centralised middleman. They both earn interest from lending and pay it when they borrow.

All of the tokens on the Aave network, known as ERC20 tokens, use the Ethereum blockchain to perform transactions. Aave was initially constructed on top of the Ethereum network. Since then, Aave has expanded to include chains like Avalanche, Fantom, and Harmony.

A decentralised autonomous organisation, or DAO, is used by the protocol itself. It is therefore run and governed by those who own AAVE tokens and use them to cast their votes.

Or

By putting cryptocurrency into a pool contract with several reserves, lenders create liquidity in AAVE (each contained within). The same arrangement also permits borrowing against the pooled funds by putting up collateral. The amount borrowed and its collateral serve as the loan's security instead of individual matching contributions. This makes it possible to get loans right away with attributes based on pool status.

Decentralized Storage

A distributed storage system is more resilient than a centralised server run by a single business or organisation because it is made up of peer-to-peer networks of user-operators who each hold a fraction of the total data. offers a technique for creating file storage shares. These might be found in peer-to-peer networks or blockchain-based apps. Blockchain-related businesses are investigating and putting into practise decentralised storage as a viable solution. It is a technology that enables file storage without relying on massive, centralised data silos that jeopardise significant ideals like privacy and information freedom. IPFS is an illustration of a distributed storage system. In order to develop a new method of disseminating information via the Internet, Protocol Labs created the InterPlanetary File System (IPFS) protocol.

Information is provided by IPFS based on its content rather than its location (location). You can set the privacy of peers and nodes you trust to get your files and choose where to acquire your content using their routing algorithm.

5. Implementation

Implemented Deposit Section of the Lending Pool in JSX. We considered symbol of crypto asset , wallet balance , whether the user is approved for the request or not and the depositAsset model.

Implemented Borrow Section of the Lending Pool in JSX. We considered symbol of crypto asset , available to Borrow , whether the user is approved for the request or not and the BorrowAsset model.

6. Results

We built the deposit and borrow functions for the dummy crypto assets in JSX of the lending pool.

Created a sample React project for our front-end.

7. Conclusion and Future Scope

7.1 Conclusion

In this research, we examine the architecture and operation of the leading Ethereum lending services. They serve as the foundation for the system we suggest, which upholds user reputation based on financial behaviour and rewards users with solid credit histories.

Additionally, we suggest loans that employ NFTs as collateral so that holders of NFTs might borrow some extra assets using the illiquid assets as collateral.

7.2 Future Scope

Writing smart contracts via the Upgradable Smart Contract Architecture is part of the next development. Once deployed, smart contracts are immutable and cannot be upgraded. The Upgradeable Smart Contract architecture, however The code can be reorganised into several contracts, enabling logic upgrades while keeping the storage the same. It is also possible to integrate with a Decentralized Autonomous Organization (DAO) to enable protocol users to vote on choices relating to protocol updates. A general-purpose credit scoring framework might be created that interacts with and collects information from various Defi applications to calculate a user's credit score.

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