Mortgage Platform Proposal

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Executive Summary

This report provides a blockchain based crowdfunding mortgage platform built on Ethereum platform. A brief description of the problem and the solution will be presented. Then followed by three case studies that explain three different roles in the platform. Those roles include borrower, people want to borrow money from other people; investor, people want to give out money to earn more; and verifier, people from trusted third parties want to earn extra money. An entity relationship diagram of different contracts on Ethereum is given to illustrate relationships between each entity. At the end, a Gantt Chart with milestones will give us a whole picture of the schedule of this project.

Project Description

Introduction

The mortgage market is a multi-billion market that has seen some serious lows in the last couple of years. The high amount of borrowers defaulting their mortgage played a big role in the 2007-2008 financial crisis. Taking a mortgage from Dutch financial institutions can be done as follows. First, the borrower needs to decide what the possibilities are. When the financial situation of the borrower has been assessed, a house can be chosen that fits the borrower's needs. When an agreement has been met with the seller of the house, a mortgage can be settled with a mortgage lender. Together with the lender, the borrower will be able to choose a mortgage type that fits their financial situation.

While the maximum amount of the mortgage is a legal limit, financial institutions will usually only provide a fraction of the property value amount. How much the financial institutions will exactly provide depends on the Loan-to-Value ratio, which differs from case to case. Instead, it is expected that the borrower provides a down payment of the remaining value. The large down payment means that people that are looking to buy a house will have to save up before they can buy a house.

To enable borrowers to get the capital they need but do not have, crowdfunding is a solution. Such crowdfunding platforms already exist and they are becoming more popular. Some give the opportunity to crowdfund mortgages, while others are more general and provide a place for entrepreneurs to find funding for their projects. These projects range from opening a new shop to projects like installation of personal solar panels. What these platforms all have in common is that they are centralized, which means that there is a third party that connects the investors with the borrowers for a fee. Thus the crowdfunding services that these platforms provide are not free. A way to eliminate this unneeded cost is to make a decentralized platform, where no middleman is needed.

Problem Definition

The process of getting a mortgage now is both time and money-consuming. For example, it has an average cost of 4,000 dollars and 45 days for a house mortgage in Australia. And only citizens with good credits are prone to be given a mortgage. It is really difficult for those who have no records or bad records to get a mortgage, for example, young adults. As the value of houses keep rising, it is becoming increasingly difficult for people to receive a mortgage. Additionally, because of the mortgages not covering the total cost of the estate, the only possibility is to make a large down payment. There is need for a system that connects different parties together. These parties consist of the borrower, the investor and the financial institution. The three stakeholders have their own incentive to work with each other. The borrower needs a financial institution to settle a mortgage, and investors to fund the initial down payment. In return, the investors and the financial institution can receive interest on their respective investments. To solve the mentioned problems, we focus on creating a platform where mortgages can be partially crowdfunded.
Crowdfunding platforms are getting increasingly popular to create funds for projects in which financial institutions are not investing. Platforms on which it is possible to get your mortgage crowdfunded already exist, yet on all of these platforms there is a central party that connects the investors with the borrowers. The central party is not only unneeded, but also brings unnecessary costs and risks. Bringing down the middleman will bring down the entire system.

To avoid that the entire system collapses when one of the middlemen drops out, the system needs to be decentralized. During the project we will strive to create a platform where people can apply for mortgages that are funded by both financial institutions and investors. A person will be able to apply for a mortgage, when the mortgage has been accepted by thirds verification parties, it will be transferred to an open market where investors can fund the remaining part of the the house cost. The interest rate on these investments will be negotiated between the borrower and the investor.

The aim of this project is to create a decentralized market where it is possible to crowd-fund a mortgage. The system will not be controlled by a single party, but mostly by supply and demand.

Solution

In this project, we will build a decentralized mortgage platform that anyone can borrow money from and both individual and institutional investors can participate. Third parties like government departments and banks can join the platform as verifiers to authenticate all the documents users uploaded.
The platform has three layers. First, there is a website providing the interface for users to interact with. Users will register as different roles and upload documents to prove their identities and qualification to be involved in certain activities. Users will be able to connect their ethereum wallet in the website as well. Second, we need a back-end server to handle requests and save data that will not be saved on ethereum like pictures, documents etc. Last, we will build a set of smart contracts on Ethereum.

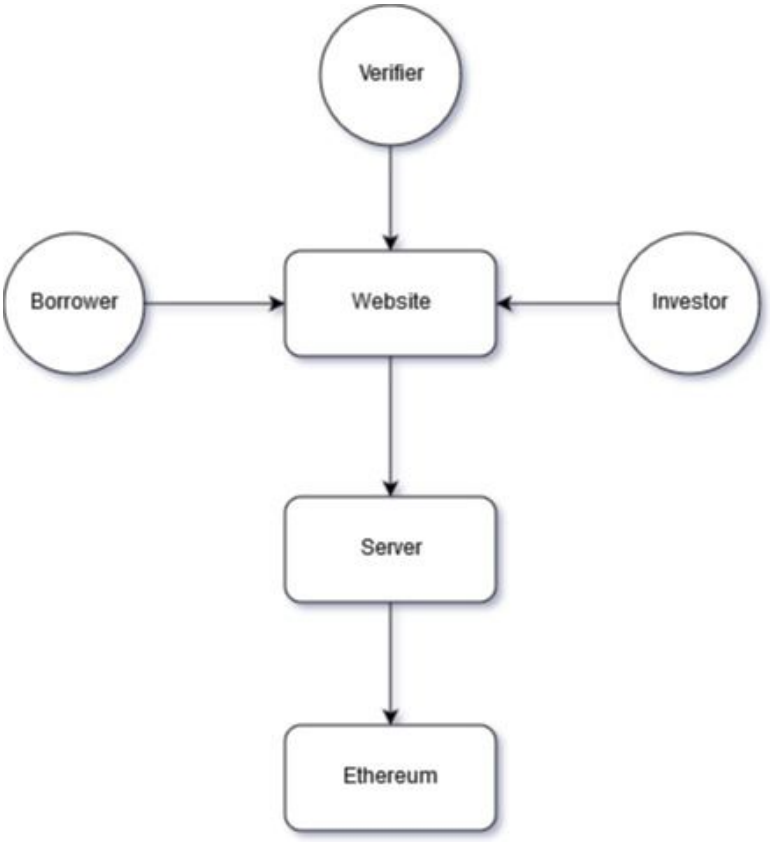

Figure 1: System Overview

Use Case

Borrower

A borrower is the initiator of the whole business process. Anyone who wants to borrow money from others can submit a request including how much funds he needs for what reason, the interests he is willing to pay and all the documents to support his statements.

Because there are two types of borrowers, the first one are those who want to raise funds to buy a property, and the second are those who already have a property but want to raise funds for other purpose. They need different documents and different third parties to verify the documents, and there might be other types of borrowers with different collaterals. Hence, the platform should be open and flexible to future changes. All documents provided by borrowers will go to third party verifiers, only after all of them are verified, the request can be presented to investors.

Investor

An investor can be both a person or an institution like a bank or a foundation. We want personal investors to participate because usually it takes a long time for institutions to make a decision, even though they can give out a large amount of money. And the threshold to get funds from institutions is also high, which means people with low credentials can barely get funds from them. People who want to register as an investor should provide their identification and financial statements to go through our KYC(know your customer) process. Because there is a relatively high risk involved with this kind of investment, we need to know people are qualified to do so.

Verifier

A verifier is an authenticated person, a company or a department of the government. He is responsible for verifying one of the documents. A photocopy of the document will be sent to the verifier and he needs to use his knowledge or his access to certain database to decide whether is it a genuine document or not.

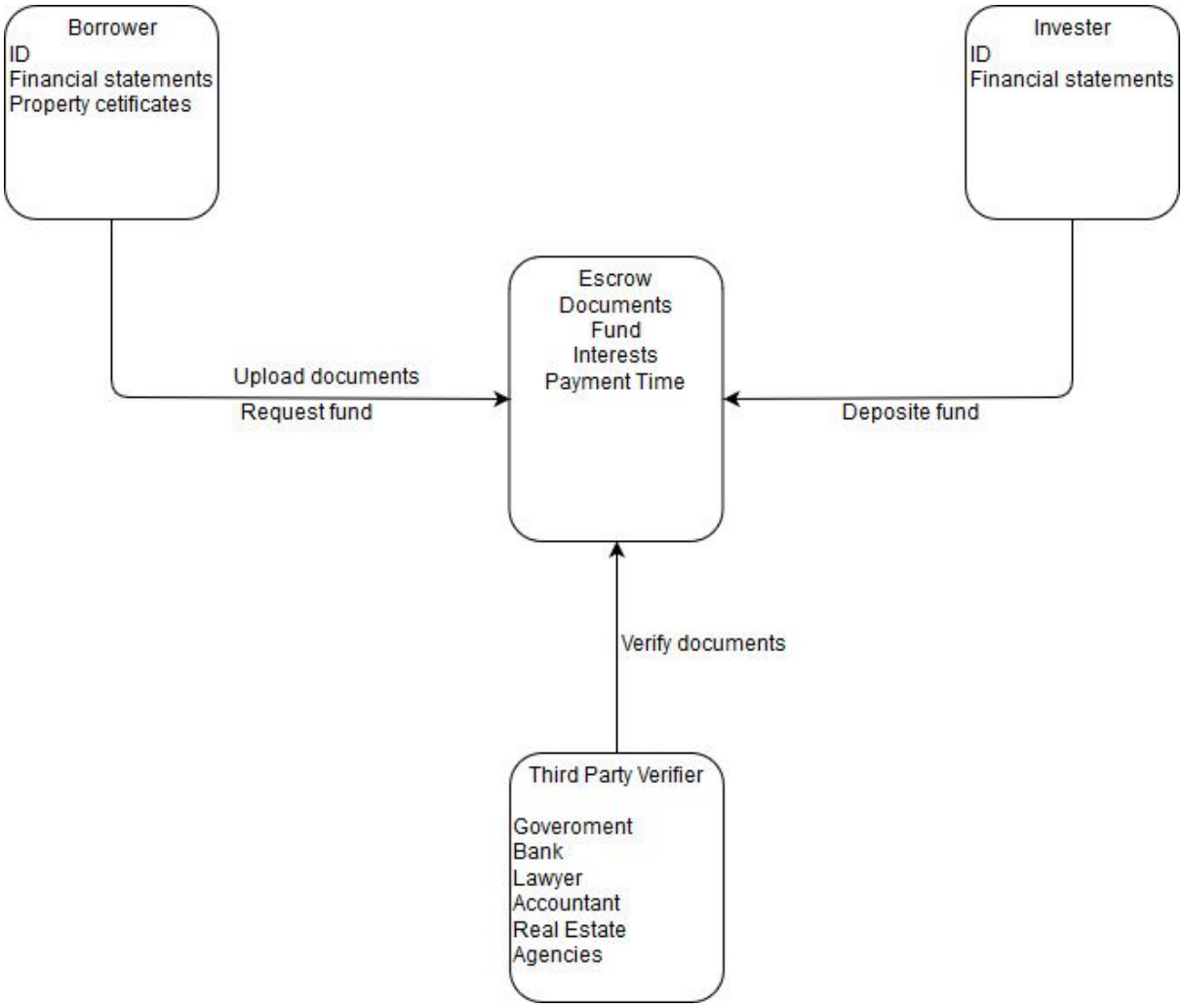

Figure 2: Interaction Overview

Technologies

Ethereum

Ethereum is a public blockchain that provides smart contracts. Smart contract is a piece of code that will run on every node of the network so it is guaranteed to be executed. We perform business logic inside smart contracts and any data change will be saved eternally on Ethereum.

Nodejs

Apart from blockchain, we still need a front-end client to interact with it. In this project, a website with basic GUI will be provided for users to perform basic actions to go through the whole business process.

Schedule

Week1: Plan for the whole project, chose topic etc.
Week2: Define the scope of the project, setting up development environment.
Week3: Figure out the process of each party and relationship between them. Draw diagrams.
Week4 : Draw entity relationship diagram.
Week5: Design interfaces of smart contracts.
Week6-7: Implement smart contracts.
Week8-9: Design and implement GUI.
Week10-12: Write thesis and prepare for presentation.