Loan and Investment Portfolio Management Using Block Chain

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ABSTRACT

Enterprises like MSMEs (Medium Small Micro Enterprises) contribute huge percentage of growth to the Indian economy. A total of 49% of the total exports are From the MSME sector. As in recent times these industries have seen a huge growth. To meet the requirements of the need of borrowing or to take loan especially non-collateral loan has increased. So, lenders like NBFCs and Banks with the help of Government of India's schemes made the process of giving loan easy. As the MSMEs are growing some are facing the problem of managing their borrowings and their corresponding investments. So, this System, investment portfolio management using block chainwebapp manages the borrower's capital by keeping track of their complete EMI (Equated monthly installment) schedule, their working capital and their expenditures. It also helps the lenders to manage their lending and also benefits the team who are working with the borrower so that there is transparency in the business this transparency is achieved by using the block chain. This system loan and investment portfolio management using block chain helps in solving this common problem.

Key Words:
Block chain, WebApp, Loan, Investment,Equated Monthly Installment

1. INTRODUCTION

One of the major problems the MSME sector facing is the ability to efficiently manage their borrowing and their investment. Because of this business are not able to meet their business model. In This system there are three users one the borrower second the lender and third partners or the team with the borrower. Each tab has its own features that help that particular user. As business grow the demand for non-collateral loan are increasing. The main factor in non-collateral loan is the borrower's ability to pay the EMI without fail, because if the borrower fails to pay the EMI for three consecutive months then the banker will prosecute that individual. To avoid this lender are needed to provide with required business modal of the borrower so that they are given a guarantee that the borrower will repay the loan. The system is equipped to create a business planner by the user with can be shared with the lender.

1.1 EXISTING SYSTEM

Present day system deals with loan sand investment separately. The lenders like the banks, NBFCs etc. have their own system that keeps track of the borrowers EMIs. And it imitates them about the EMI at the beginning of the month. But majority of the borrows in India still use pen and paper to record their transactions, but there some software that exclusively monitor only the investments but does not care about their borrowings.

DISADVANTAGES

The following are the disadvantages or limitations of the existing system.They are as follows:

1. Majority of the small enterprise still use pen and paper.
2. The platform is not common to manage their business, loan and investment at the same time.
3. Unable to keep track of their returns, mis and spending's.
4. Majority of these systems are paid.

2. PROPOSED SYSTEM

In this section we mainly discuss about the proposed work that was carried out in finding the work that is related to loan and investment portfolio management using block chain.

In this system it makes seamlessly easy to manage the business modal, borrowings, working capital management, spending's, communicating with partners or the team. Establish trust in business using block chain so whenever a transaction happens all the participants are notified easily. And using the block chain the establishment of records of financial data by a bank is easy.

ADVANTAGES

The following are the advantages of the proposed system, they are as follows:

1. Ease of business management
2. Common platform to manage the borrowings and their corresponding investment's
3. Helps to get insights of the business
4. Uses block chain to achieve transparency.

3. THE PROPOSED USEDMETHODOLOGIES

In this section we mainly discuss about the proposed methodologies used for loan and investment portfolio management using block chain

3.1 LOAN AMORTIZATION SCHEDULE:

The EMI scheduler gives the complete schedule of the EMI payments with briefings of eachmonth separating the EMI into the principal paid and the interest payed.it also shows the total balance at the end of each month. This first step helps the borrower in understanding the overall payment they should go through. It also divides based of the how the loan is released in terms. This scheduler is linked to all the components so that a complete insight report can be generated at the end of each month or the end of the term based on the requirement of the user. The EMI scheduler can also help to compare the EMIs of different lenders.

3.1.2 CALCULATING THE PAYMENT AMOUNT PER PERIOD

The formula for calculating the payment amount is

$$A = P \frac{r(1+r)^n}{(1+r)^n - 1}$$

Where

A = payment Amount per period

P = initial Principal (loan amount)

r = interest rate per period

n = total number of payments or periods.

3.1.3 CALCULATING THE RATE PER PERIOD

$$r = \left(1 + \frac{i}{n}\right)^{\frac{n}{p}} - 1$$

Where

r = rate per payment period

i = nominal annual interest rate

n = number of compounding periods per year

p = number of payment periods per year

Chart-1: Intrests Amotization for 24 months

3.2 THE WORKING CAPITAL MANAGEMENT

The system is featured with to keep tract of the released term loan. This capital management keeps tracks of all the places the capital in invested in. It is similar to the inventory system management tool. For example, if the borrower business is a manufacturing industry the system helps to show what the raw materials are procured, the quantity associated with them. On entering the price for one quantity of an item the will automatically give the full price by multiplying with the qualities with that price, the working personnel salary, the logistics cost, production cost. It does not store duplicate data. Every time a new data is added the corresponding graph is generated to understand the investment easily and make fast decision. This tab Is both an inventory manager and the investment tracker.

3.3 EXPENDITURE MANAGEMENT

The small spending's also needed to be tracked to make a business successful. So, this component keeps track of the regular spending's like taxation, electricity, water bills maintenance costs, leasing's. It is also linked with the EMI schedule and the reporter to so that the expenditures are not crossing the thrust hold limit of the term or that particular month. It checks so that there are no over expenditures. Gives a graphical report in form of graphs on the expenditure spends.IT helps the borrower in understanding the small areas where the amount is used.

CHART-1: LOANS INTERESTS IN 24 MONTHS
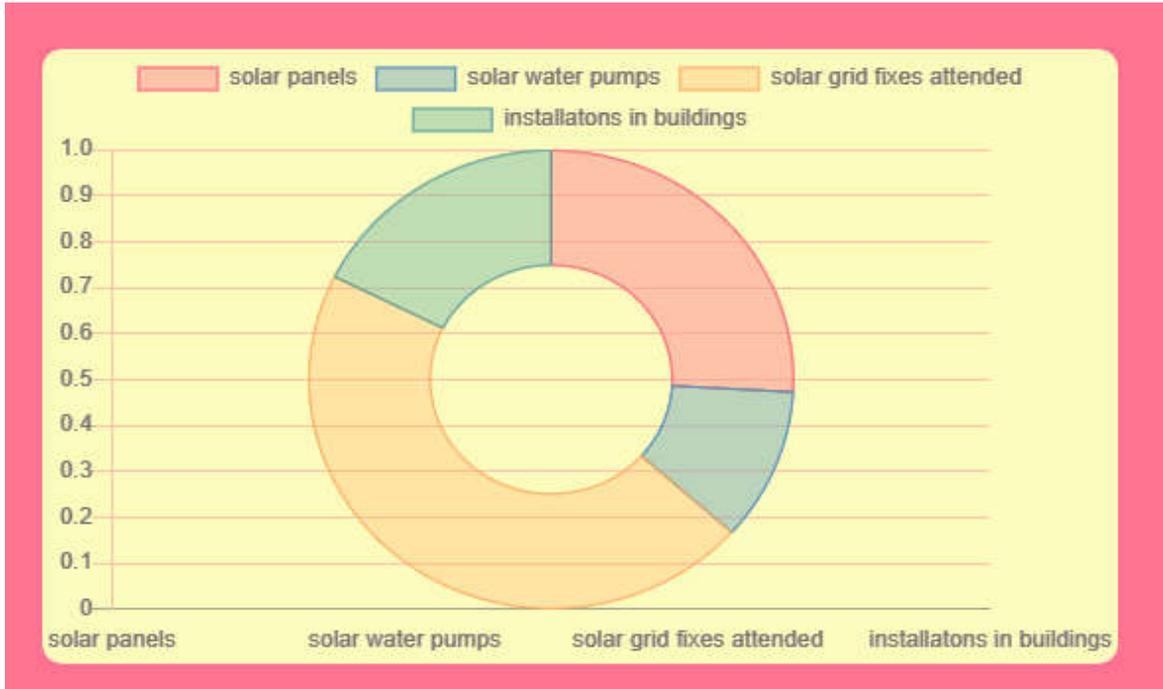
CHART: RETURNS ON THE INVESTMENT

4. LENDERS POINT OF VIEW ON THE SYSTEM

As the non-collateral loan are increasing there are more and more lenders like the NBFC's, Government banks, Private Banks etc. this system is used to help the lenders to keep track of the different borrowers, terms or months based on the agreement in which the loan is released the present term in which the borrower is in and the outstanding the EMI payments. it also is provided with the optimal feature in which if agreed by both the borrower or the lender is that if the borrower has any unpaid EMI then the lender Can monitor the returns of the borrower for the next one consecutive month. Here there is violation of privacy or business security as borrowers do file their returns at an auditor to get a loan issued by bank. This helps the lender in identifying issues so to decide whether of the next terms money can be released. If at all the loan is not a termly one the bank can have a dialogue with the borrower.

5. THE REPORTS

The reports component understands all the data in the capital and the spending components and has three thrust holds marks one at the 10%, second at the 20% and third at the 30% to reach the terms loan limit. This also helps the system in generating future reports that are based on the present spending pattern. For example, at end of the twenty days of a month this component collects all the twenty days data and generates the possible amount that can be spent in the next 10 days and give warnings. This also sorts the items based on whether the pending of that particular item is increased or decreased. It is like a brief report on the business that has happened at that point of time.

5.1 RETURNS CALCULATION

This component calculates all the returns based on the how they are received for example selling machinery components and other sources it generates graph with respect to the source of the returns. This also helps in generating a better report.

5.1.1 RETURN ON INVESTMENT (ROI)

- Return on investment (ROI) is a rough measure of an investment's profitability.

- The metric has a wide range of interpretations, such as the profitability of purchasing a new manufacturing equipment, or the result of a real estate transaction.

- The ROI is calculated by dividing the net return on investment by the cost of investment and multiplying by 100% or by subtracting the initial value of the investment from the final value of the investment, dividing this new number by the cost of the investment and multiplying it by 100%.

- ROI is comparatively easy understand, and it is a standardized, universal measure internationally.

- On the downside, ROI doesn't account for how long an investment is held, making comparing investments less useful to an investor than a measure that incorporates the holding period.

STEP-1:

$$ROI = \text{Cost of Investment Net Return on Investment} \times 100\%$$

STEP-2:

$$ROI = \text{Cost of Investment Final Value of Investment} - \text{Initial Value of Investment} \times 100\%$$

$$\text{Annualized } ROI = [(1+ROI)^{1/n} - 1] \times 100\%$$

Where:

$n =$ Number of years for which the investments held

5.2 BORROWERS TEAM MANAGEMENT:

In this component the borrower's team can also view data of the different components and also can chat with each other to share insights.

6. METHODOLOGY

MVC (MODEL VIEW CONTROLLER) PATTERN:

MVC offers architectural benefits over standard JavaScript it helps you write better organized, and therefore more maintainable code. This pattern has been used and extensively tested over multiple languages and generations of programmers.
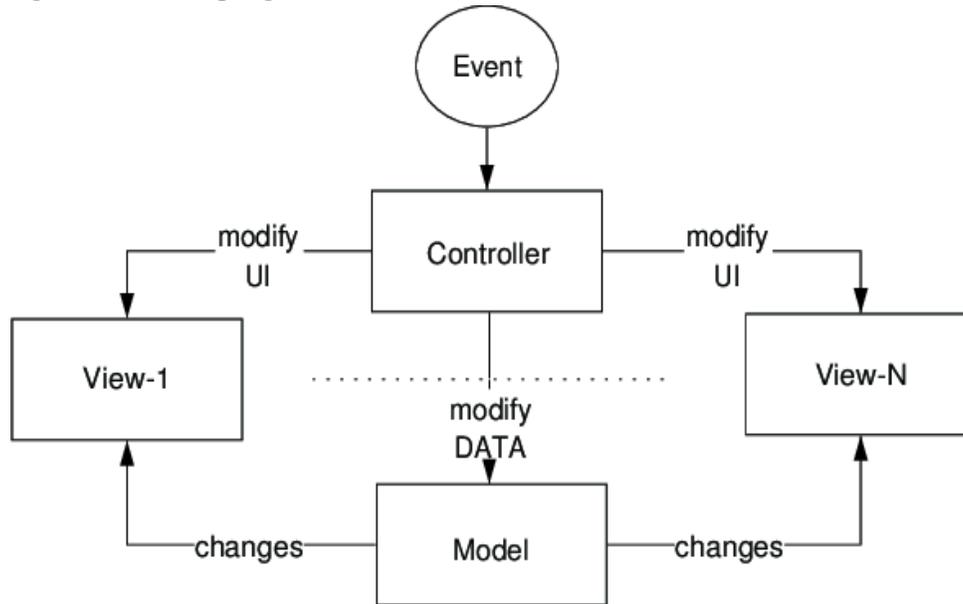

FIG-1: ARCHITECTURE OF MVC

Now let us discuss about the every individual component in the architecture diagram in detail as follows:

MODEL

Model is where the application's data objects are stored. The model doesn't know anything about views and controllers. When a model changes, typically it will notify its observers that a change has occurred.

VIEW

View is what's presented to the users and how users interact with the app. The view is made with HTML, CSS, JavaScript and often templates. This part of your Chrome App has access to the DOM.For example, in the webapps; you can create a view that nicely presents items to your users. Users can also enter data item through some input format; however, the view doesn't know how to update the model because that's the controller's job.

CONTROLLER

The controller is the decision maker and the glue between the model and view. The controller updates the view when the model changes. It also adds event listeners to the view and updates the model when the user manipulates the view. In the web apps, when the user checks an item as completed, the click is forwarded to the controller. The controller modifies the model to mark item as completed. If the data needs to be persistent, it also makes andsync save to the server. In rich client-side web app development such as Chrome Apps, keeping the data persistent in local storage is also crucial. In this case, the controller also handles saving the data to the client-side storage such as File System API.

SERVER-CLIENT CONNECTION USING AJAX (ASYNCHRONOUSJAVASCRIPT AND XML):

Asynchronous JavaScript and XML, while not a technology in itself, is a term coined in 2005 by Jesse James Garrett, that describes a "new" approach to using a number of existing technologies together, including HTML or XHTML, CSS, JavaScript, DOM, XML, XSLT, and most importantly the XMLHttpRequest object. When these technologies are combined in the Ajax model, web applications are able to make quick, incremental updates to the user interface without reloading the entire browser page. This makes the application faster and more responsive to user actions.
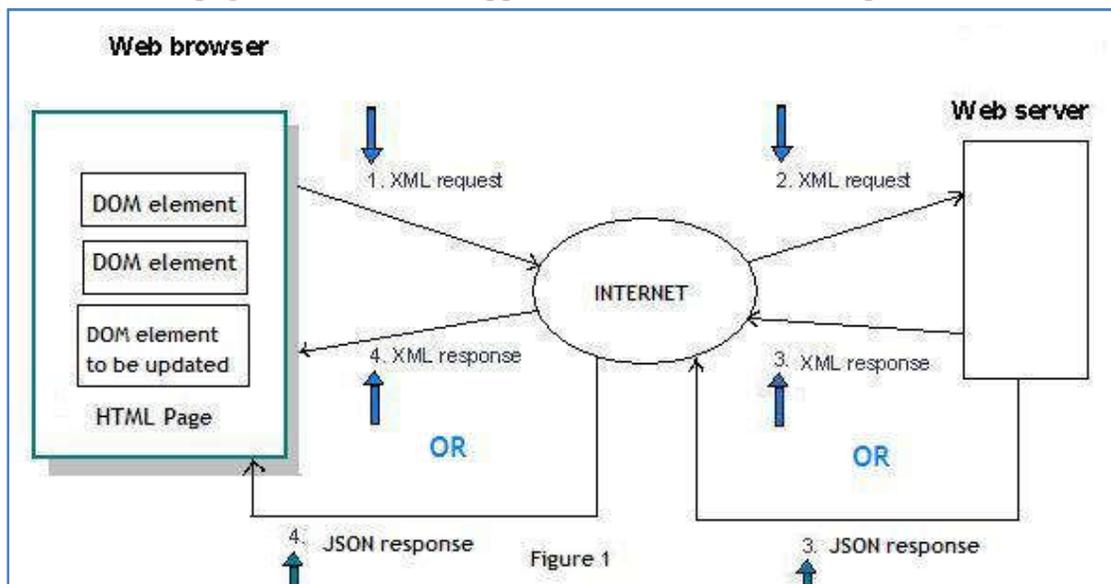

FIG-2: REQUEST AND RESPONSE USING AJAX

6.1 USE OF BLOCK CHAIN

One of the main reasons to use block chain is to provide security, reliability and low maintenance when deployed on the server. In this system the block chain is used to keep track of different spending. It is used to store documents so that the reliability of document is more. From the lenders perspective each block contains the data of each borrower and every time EMI payment is done a new block is added to the chain so making the system more reliable. From the perspective of the user the user investment are stores in blocks syncing one after the other investment so the Team and partners in the system can have trust in the business.

ENCRYPTION USING SHA-256

SHA algorithm works on chunks of data which are a multiple of 512.It takes input as a 256 bit and append padding bits and finally add 64 bits to the word making the sum of the bits to n*512. The algorithm then divides the total word by n and runs the algorithm 64 times.
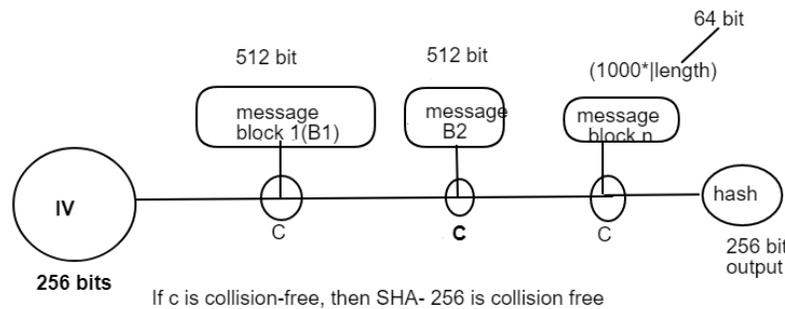

FIG-3: SHA-256 ALGORITHM FLOW

6.2 SMART CONTRACT FOR EMIS

The borrower and lender can together issue a smart contract with field required by both. This smart contract will automate the process of managing the EMI payments for the bank as it stores the timestamp, account from which money was transferred. If the borrower fails to pay a moths EMI then the smart contract will also store the reason. These block chain stores tractions from the starting of application of loan to the final months EMI payment. This system helps lenders like banks to easily track and make the process of lending in less time compared to the tradition system.
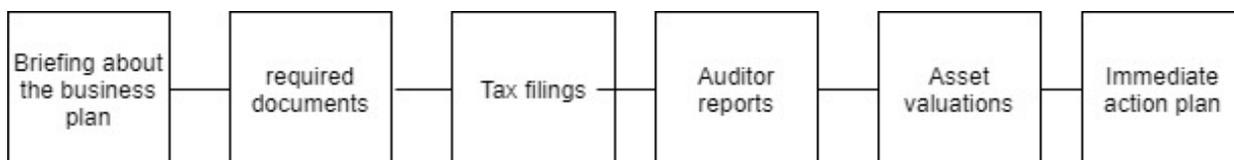

FIG-4: SEQUENCE OF DETAILS OF THE LOAN IN THE BLOCKCHAIN

6.3 MANAGING THE INVESTMENTS FROM THE BORROWINGS

As the user inputs data in the expenditures or the working capital fields each of these data are stored in a distributed ledger. And part of these ledger transactions are stores in blocks of a blockchain.so that it is easy to track and share with the participants in the block chain network.

7. RESULT

To ensure that there are no defaulters because of lack of management of their borrowings. Help the MSME sector.

To grow

CHART-3: THE OVERALL BUSINESS REPORTS

8. TECHNOLOGIES USED

The following are the technologies used for implementing the proposed application

1. **NodeJS:**Node. js is a platform built on Chrome's JavaScript runtime for easily building fast and scalable network applications. Node. js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient, perfect for data-intensive real-time applications that run across distributed devices.
2. **ExpressJS**: Express. js is a Node. js web application server framework, designed for building single-page, multi-page, and hybrid web applications. It is the de facto standard server framework for node.

3. **Truffle Framework:** Truffle is a framework for building, testing, and deploying applications on the Ethereum network that was founded by Tim Coulter. The TruffleFramework consists of three primary development frameworks for Ethereum smart contract and decentralized application (dApp). Development called Truffle, Ganache.

4. **Solidity language:**Solidity is an object-oriented programming language for writing smart contracts. It is used for implementing smart contracts on various block chain platforms, most notably, Ethereum.

5. **Ethereum**: Ethereum is an open source, public;block chain-based distributed computing platform and operating system featuring smart contract functionality. It supports a modified version of Nakamoto consensus via transaction-based state transitions.

9. CONLUSION AND FUTURE WORK

In this proposed application we finally designed an application to ensure that there are no defaulters because of lack of management of their borrowings. It is also used to help the MSME sector to grow.As a future work we want to continue with following things like: to integrate with borrower's bank. Manage other investment options. Analyze the business more. Display content in regional languages.

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