DEMI decentralized microcredit platform

5.5.2019 Ver 1.0

—

Maksim Kiselev

DEMI

Introduction

With the advent of the blockchain, which is a decentralized network of nodes, appeared a new kind of applications working with blockchain data: transactions and user tokens. Applications running on the blockchain and using its capabilities are called decentralized applications (DAPP).

At the heart of any DAPP are the Bitcoin ideas:

- cryptographic trust,
- transparent transactions,
- transaction irreversibility,
- anonymity of participants,
- low transaction fees,
- high transaction speed.

Bitcoin white paper starts with: *"Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust based model. Completely non-reversible transactions are not really possible, since financial institutions cannot avoid mediating disputes. The cost of mediation increases transaction costs, limiting the minimum practical transaction size and cutting off the possibility for small casual transactions, and there is a broader cost in the loss of ability to make non-reversible payments for nonreversible services."* [1]. This is about all financial institutions - funds, banks, credit and payment organizations.

Bitcoin made the foundation for a variety of trustness solutions and transaction issues. There are solutions for:

- secure cryptocurrency storage and sending - cripto-wallets,
- secure cryptocurrency exchange - decentralized exchanges,
- secured crypto loans,
- community fundraising - smart-contracts for ICO,
- trusted PvP mode game applications - player versus player.

All decentralized applications compete in resolving issues of:

- trustness - the exclusion of a third party in the transaction, trust only the cryptographic signature,
- service fee - the absence of a third party significantly reduces the transaction fee,
- transpancy - all transactions are visible to all participants,
- anonymity - only addresses in the blockchain are visible.

---

[1] Bitcoin white paper https://bitcoin.org/bitcoin.pdf

The expanding range of possibilities of using cryptocurrency and tokens in DAPP increases its demand and as a result increases its cost. Different cryptocurrency assets (tokens) change their value. Some tokens are more valuable and in demand, these tokens are more often used in DAPP. There is a growing demand for valuable tokens.

Two main groups of users form around the the high demanded token: the first group prefers to keep the token and not spend it, the second group sees opportunities in using this token and multiplying: profitable trades, short-term investments, gambling and others.

Thus, on the one hand, there are users who are ready to give the token for a short time and eventually return it with interest, having earned money. On the other hand, there are users who are ready to borrow the token for a short time and return it with an additional percentage. This forms a request for crypto lending.

An important part of any credit is repayment guarantee. In an anonymous blockchain network, it is difficult to make a credit repayment guarantee by trust between users. The most reliable guarantee is the borrowers pledge. Thus, the pledge becomes loan collateral and in case of borrower not repay loan, the pledge is transferred to the lender.

The lender and the borrower should be able to independently determine the best conditions for a crypto loan: loan amount, interest rate, period, type of collateral and amount of collateral.

In this paper, I propose a solution for creating an open platform for microcredit, allowing any crypto[2] owner to offer it on credit on his own terms - as a lender or to request the necessary crypto amount on his own terms - as a borrower. Such an open platform will provide any participant:

- the opportunity to be a lender and a borrower on your own,
- offer on credit available tokens as collateral for other tokens,
- ask for loans of required token with a pledge of another token
- accept credit offer
- issue the requested loan.

Technical details

Decentralized Application (DAPP) DEMI consists of five parts:

- **DEMI web application** - a browser-based application written in Javascript and HTML, that performs interactions with the DEMI smart contract. The application does not keep private keys, it connects to the blockchain using a browser wallet

---

[2] Means the main token and any blockchain token DEMI works with.

extension (TronLink). The application has no server part and works only at the client's browser, interacts with the blockchain using a browser wallet;

- **DEMI addon** - an embedded application written in javascript and HTML, that performs interactions with the DEMI smart contract. Functional copy of the web application DEMI, designed to run from within other DAPP. May have several color schemes to match the design of the DAPP from which it is run;
- **DEMI smart contract** - a decentralized application written in Solidity language, which stores all data of the credit platform and records changes to the blockchain. Responsible for compliance with all conditions of loans and the formation of transactions for the creation, acceptance, payment and closing of loans;
- **DEMIOWN smart contract** - a decentralized application written in Solidity language, storing all data on the distribution of the platform commission between DEMI token owners and payments made to referral program members;
- **DEMIORACLE application** - a centralized application written in Python language, that collects platform fee data (profit) and makes payment calculations for DEMI tokens owners.

Key roles in the DEMI application

Administrator - platform administrator, performs the configuration:

- platform commission percentage for a credit asset,
- platform commission percentage for a pledged asset,
- setting, describing and adding (listing) tokens - assets involved in loans at the DEMI platform;

Oracle - administrative account, collects data for the distribution of rewards through the smart contract DEMIOWN. Makes reward calculations for DEMI tokens owners.

User - an account of any blockchain user, client of the DEMI platform.[3]

DEMI web application

It will be performed in a minimalist style, the main tasks:

- provide users with a clear and simple credit search, with the ability to filter by available credits at the DEMI platform,
- create credit proposal, indicating user's conditions,
- create request proposal for getting a loan, specifying user's conditions,
- show user all his created proposals,
- show user all his accepted proposals,
- show user all condition details for each proposal,

---

[3] DEMI does not store any user data, except the public address, which is open and publicly available information.

- provide user ability to manage his proposals: payment, closing,
- provide user view token balance

DEMI addon

embedded application, functionally the same as the DEMI web application, designed to run from within third-party DAPP, the main tasks:

- all above features of the DEMI web application,
- executing as an embedded application from within third-party DAPP, customizable color scheme to match the style of third-party DAPP,
- provide users with quick credit access,
- provide third-party DAPP improved user solvency

DEMI smart contract

Functions implementations:

- Registration and change of token data performed only by the administrator,
- Loan creation - performs the lender or borrower,
- Loan acceptance - performs lender or borrower,
- Loan payment - performs borrower,
- Loan closure - performs lender or the borrower,
- View a list of available loan proposals or loan requests - performs lender or borrower,
- View user assets balance - performs lender or the borrower on his assets.

When creating a loan or loan request, the user sets:

- the loan token, amount;
- the collateral token, amount;
- interest rate for the period;
- the period duration, measured in blocks (in TRON network 1 block ~ 3 seconds), the web application will convert the duration hours into blocks and show the user;
- the total loan duration from the moment the loan is accepted by the other party, within which the payment is to be made, is measured in blocks of the TRON network. DEMI web application will help translate time duration into blocks amount and show it to the user;
- The commission on profit in the credit token - DEMI platform commission is indicated as a percentage and is imposed only on the earned profit in the loan, for example, a loan of 1000 tokens, loan repayment sum 1010 tokens, a platform commission of 10% is taken only from the profit of 10 tokens, 10 tokens * 10% = 1 token, in total, the lender will receive 1009 tokens, and the DEMI platform will receive 1 token as fee;

- The commission on the pledge token, the platform commission is indicated as a percentage and is imposed on the entire amount of the pledge. If the borrower did not pay the loan, after the loan is closed, the lender receives a pledge token minus commission. For example, a pledge of 25 tokens, a commission of 1%, a lender will receive 24.75 tokens (25 - 1%), platform will receive 0.25 tokens (25 * 1%);
- if the user creates a loan, he is a lender and with the creation of the loan sends the lending token to the DEMI smart contract in the specified amount;
- if user requests a loan, he is a borrower and, with the creation of loan request, sends pledge token to the DEMI smart contract in a specified amount.

After creation, the loan proposal change status to "Open".

User see the "open" porposal and decides to accept it. Accepting credit terms, the user sends tokens to the smart contract:

- if user is a borrower sends amount of the collateral;
- if user is a lender sends amount of the credit token.

After accepting the loan terms, the loan proposal changes status to "Accepted", the borrower immediately receives credit token and can use it. The pledge remains on DEMI smart contract until the loan is closed.

Any time, the borrower can repay the loan. Only whole loan with interest can be paid. Loan interest is calculated immediately after the loan is accepted, since already started the first period of the loan.

Period interests is summed up, the calculation takes the number of periods of loan use, including the current one, and the total percentage is calculated as "Number of periods" * "The percentage of one period".

Example.

The loan = 1000 AAA tokens, acepted at block number 1, period = 3 blocks, percentage per period = 1%.

Calculation sum to repay at block 2, will be 1000 AAA * 1% * 1 period = 1010 AAA.

Calculation sum to repay at block 3, will be 1000 AAA * 1% * 1 period = 1010 AAA.

Calculation sum to repay at block 4, will be 1000 AAA * 1% * 2 periods = 1020 AAA.

Calculation sum to repay at block 7, will be 1000 AAA * 1% * 3 periods = 1030 AAA.

and so on.

Thus, interests are summed up by the number of periods and applies on the whole amount of credit tokens. An easy and understandable credit calculation for lender and borrower is provided.

The loan propose at the DEMI platform has four states:

- **Open** - created loan or borrow proposal, can be closed by creator, with token refund (no fee is charged). Can be opened without time limit. May be closed or accepted.
- **Accepted** - the loan proposal is accepted, credit token has transferred to the borrower. Before the loan expires, can be repaid by the borrower, can be closed after the loan expiration.
- **Repaid** - only accepted application can be repaid before the loan expired. At the repayment, the pledge token is fully returns to the borrower.
- **Closed** - loan proposal can be closed by the creator from the "open" state. It can be closed by the lender or the borrower from the "repaid" state. It may be closed by the lender from the "accepted" state and not repaid if the loan has expired.

DEMIOWN Smart Contract

Commission fees in tokens are collected and transferred to the DEMIOWN smart contract. Reward calculations occur at a configurable frequency (no more than once a week). The payment request formed by the users themselves according their balance.

Payment period length settings and payment calculations is made by the Oracle user, using the DEMIOWN smart contract and DEMIORACLE application.

Reward calculations occur only for DEMI token owners, who confirmed their participation in the reward program by freezing DEMI tokens. Freezing is performed at the DEMI web application.

Referral program users are also accrued remuneration, calculated in the smart contract DEMIOWN. Referral program participation not require DEMI tokens; to participate, user must register its account address as a referral member and receive own referral link.

Referral program participants receive their parts from the fee charged by DEMI platform only from those users whom they have attracted to DEMI platform. Referral system is necessary and helps to attract users to DEMI.

The percentage paid to referral program participants at the initial stage is 1% of the charged platform fee and can be changed in settings by "administrator" user.

Service fee and its distribution

From loan profit withheld a fee of 10%. Closing unpaid credits, a 1% commission is withheld from pledge. The whole commission is a service fee of DEMI platform and is subject to distribution among the referral program participants and owners of "frozen" DEMI tokens.

Reward payment calculation

For the current payment period, is calculated loans with users attracted by referrers. Referrer (participant of DEMI referral program) receive 1% from only loans fee where his referal participated. DEMI user can be referral only for one referrer (participant of DEMI referral program who attracted user to DEMI).

After maximum 2% paid for referral program the remaining most amount (98%-100%) of reward distributed among the owners of "frozen" DEMI tokens, according to the share of tokens.

Calculation example for payment

The loan proposal, opened by the lender Alice, accepted by the borrower Bob brought a commission to the DEMI in the amount of 10 AAA tokens. The DEMI smart contract when calculating commission payments determines that Alice came by referral link from John, and Bob came by referral link from Kate. When distributing commission payments:

1. At first, calculates referral rewards to John is 0.1 AAA (1%) and Keith 0.1 AAA (1%).
2. The remaining, after referral rewards, the amount of 9.8 AAA (10 AAA - 0.1 AAA - 0.1 AAA) is transferred for the reward distribution between the owners of "frozen" DEMI tokens, according to the share of tokens.

Examples of use

The examples are based on the interaction of two users of Alice, Bob and the smart contract DEMI.

Alice is a lender, creates a loan

Step 1. Alice creates a loan for 1000 AAA tokens with a pledge of 25 BBB tokens, for one period lasting 4 hours, at 2% per period. DEMI informs Alice that if the loan is paid, Alice will receive 1018 AAA, because from 20 AAA, the DEMI will take 10% fee - 2 AAA. If the loan will not repaid, Alice will receive a pledge of 24.75 BBB, because 1% commission is taken from the pledge (25 BBB * 0.01 = 0.25 BBB). Alice accepts the conditions, creates a loan and sends 1000 AAA smart contracts to DEMI, where the tokens are blocked.

Step 2. Bob is exchange trader, sees a good trade and needs 1000 AAA for several hours, he has BBB tokens but does not want to sell it. Bob addresses the DEMI platform and seeks a 1000 AAA loan with a BBB pledge. DEMI shows a credit offer from an anonymous participant for 1000 AAA with a security of 25 BBB, at 2% for 4 hours. Bob is

happy with this offer. Thanks to DEMI, Bob sees all the conditions of the loan: need to return 1020 AAA within 4 hours, 25 BBBs are required as collateral. DEMI warns Bob that in the event of non-payment the security deposit will be sent to the lender. Bob accepts the terms by sending 25 BBBs as collateral to the DEMI smart contract.

Step 3. After a few hours, not allowing the delay in payment, Bob asks for his debt, DEMI reports that 1020 AAA is to be repaid. Bob fully repays the debt of 1020 AAA and immediately receives his collateral deposit back, 25 BBBs are returned to Bob.

Step 4. After a while (more than 4 hours), Alice asks the loan condition from DEMI. DEMI reports that the loan is fully repaid, and after deducting the commission, Alice can close the loan and receive 1018 AAA. Alice closes the loan, 1018 AAA are transferred to Alice. DEMI receives a 2 AAA service fee.

Alternate Step 3. Bob does not repay the loan.

Alternate Step 4. Alice later (over 4 hours) asks the loan condition from DEMI. DEMI reports that the loan has not repaid and Alice can close the loan and pick up a 24.75 BBB collateral deposit, with a deducted commission. Alice closes the loan, the collateral 24.75 BBB is transferred to Alice. DEMI receives a fee of 0.25 BBB.

Bob is a borrower asks for a loan

Step 1. Bob is a exchange trader, sees a good trade and needs 1000 AAA for several hours, he has BBB tokens, but does not want to sell them. Bob addresses the DEMI platform and seeks a 1000 AAA loan with a BBB pledge. DEMI shows that unfortunately there are no such loans and offers to create an credit request. Bob agrees and requests a loan on his own terms: 1000 AAA tokens with a collateral of 25 BBB tokens, for a period of 4 hours, at 1% per period. DEMI informs that Bob will have to deposit 1010 AAA to pay the loan, otherwise 25 BBBs will be transferred to the lender. Creating a request for a loan, Bob sends a collateral deposit of 25 BBB.

Step 2. Alice has AAA tokens and knows that at the DEMI platform she can lend them and earn money. At DEMI, Alice is looking for requests for AAA token credit, DEMI finds a variant requested by an anonymous user for 1000 AAA with a 25 BBB collateral deposit for one period of 4 hours at 1%. DEMI explains how much Alice will receive: if the loan is repaid, Alice will receive 1009 AAA less 10% commission from the loan profit (10 AAA * 1% = 1 AAA), if the loan is not repaid, Alice will receive 24.75 BBB, (25 BBB minus 1% commission from the collateral). Alice accepts the loan request terms by sending 1000 AAA.

Step 3. After a few hours, not allowing the delay in repayment, Bob asks for his credit request state, DEMI reports that 1010 AAA is to be repaid. Bob fully pays the debt of 1010 AAA and immediately receives collateral back. 25 BBBs are returned to Bob.

Step 4. After a while (more than 4 hours), Alice asks the loan condition from DEMI. DEMI reports that the loan has been fully repaid, and after deducting the commission, Alice can close the loan and receive 1009 AAA. Alice closes the loan, 1009 AAA translates to Alice. DEMI receives a 1 AAA as fee.

Alternate Step 3. Bob does not repay the loan.

Alternate Step 4. Alice later (over 4 hours) asks the loan condition from DEMI. DEMI reports that the loan has not repaid and Alice can close the loan and pick up a 24.75 BBB collateral deposit, with a deducted commission. Alice closes the loan, the pledge 24.75 BBB is transferred to Alice. DEMI receives a fee of 0.25 BBB.

DEMI token

The maximum token supply is 100,000,000 DEMI (One hundred million DEMI).

100% tokens distribution:

- Team, development costs and DAPP working costs - 30%
- Founder - 20%
- Investors - 50%

Major competitors with fiat loans

SALT (Secure Automated Lending Technology)

Centralized service that provides loans in fiat currencies, with a pledge of cryptocurrency.

Features:

- centralized
- dependent on the human factor
- to become a lender you need to be an accredited investor,
- only works for customers in 33 states of the United States, United Kingdom and New Zealand
- the pledge can only be ethereum (ETH) and bitcoin (BTC).
- SALT token is used to repay loan interest

NEXO

Centralized service that provides loans in fiat currencies, with a pledge of cryptocurrency.

Features:

- centralized
- a loan decision is issued by a smart contract,
- service around the world, issue a credit card,
- a large loan-to-collateral ratio, changed at the discretion of the service, is now 50%, i.e. in order to receive a loan in dollars equivalent to 1 BTC, you must leave a deposit of 2 BTC,
- fixed interest rate on a loan of 16% per annum or 8% per annum with a pledge of a NEXO token, (but for a token of NEXO a loan-from-pledge of 30%)
- no service fee

Ripio

Centralized service that provides loans in fiat currencies, with a pledge of cryptocurrency.

Features:

- centralized service,
- the lender creates a loan in RCN tokens, the service verifies the borrower and converts it into fiat money,
- works mostly at the South American market.

BlockFi

A fully centralized service that provides loans in fiat currencies, with a pledge of cryptocurrencies, also provides deposits.

Major competitors with crypto currency loans only

ETHlend

Decentralized service providing credits on ETH, with collateral in ETH and ERC-20 tokens.

Features:

- registration is required, therefore there is a certain centralization of the service,
- the collateral must be twice the cost of the loan,
- loans lasting 0 - 12 months,
- LEND token users receive a 25% discount on commission,
- plans to introduce credit rating and loans without collateral

Maker DAO

Decentralized support service for a stable DAI coin.

Feature:

- You can borrow a stable coin DAI, with a pledge in the ETH.

The main competitive advantages of DEMI

Absolute anonymity

Lack of registration, DEMI does not restrict users and provides complete freedom in proposing loan or requesting a loan.

Only own user conditions

The DEMI platform does not force or limit user in choosing the ratio of loan-to-collateral, in specifying interest rate and loan period. The only limitation is the list of assets processed by the platform, the presence of such list is associated with the configuration of each asset and this list will be actively expanded.

High Decentralization

The DEMI platform not interfere and not block loan proposals. DEMI platform administration can only configure tokens and manage the process of rewarding DEMI token owners.

The uniqueness of DEMI

The DEMI platform focuses on easy and fast user access to convenient microlending.

DEMI addon - embedded application

In addition to DEMI DAPP, an embedded application (addon) DEMI will be developed to run from within existing DAPPs, for seamless integration and user convenience. Owners of third-party DAPPs, with such cooperation, will receive additional funding in their applications, as well as referral payments from the DEMI. Users of third-party DAPPs will have the opportunity to take a loan without leaving DAPP.

Road map

2019 May - Minimum Viable Product (MVP) in the TRON test network

2019 June - a preliminary version of the main application with ownership tokens and profit distribution, the availability of applications and smart contracts DEMI, DEMIOWN, DEMIORACLE in the TRON test network

2019 July - launch all applications in the TRON main network

2019 August - advertising and promotion launch, partnership with leading gaming DAPP

2019 October - modification and launch DAPP at ETHEREUM, LOOM