https://SVOI.dev

DeFi architecture of a system based on liquidity pools and decentralized exchange on the FreeTON blockchain

INTRODUCTION:

My name is Andrey Nedobylsky, and here is submission for a #6 FreeTon DEX Architecture & Design Contest from me and my team (svoi.dev).

The aim of this work is to develop possible architectures, design approaches and a technological stack for the implementation of fast exchange (Swap) and decentralized exchange (DEX) on the FreeTON blockchain and infrastructure.

In my submission, I propose implementing the following DEX Architectures as a single system:

1. implementation of a fast exchange (Swap) on the FreeTON blockchain and infrastructure based on the “liquidity pool” approach;
2. implementation of a decentralized exchange (DEX) on the FreeTON blockchain using DEX pairs. *Within the framework of this proposed architecture, it is also provided for exchange developers to create their own wrapping DEX-pairs contracts, to set their commissions and additional functionality.*

Basic economic model and cash flow description

I swap system

The proposed architecture for the implementation of a fast exchange (Swap) on the FreeTON blockchain is based on the “liquidity pool” approach.
When implementing the Swap architecture type, the basic economic model would look like this:

1) liquidity providers place a pair of tokens - in existing liquidity pools or creating new ones;
- if a new pair is created, the primary liquidity provider sets the exchange rate of one token from the pair to another;
- in the case when the liquidity provider contributes tokens to an already existing pair (formed pool of liquidity) - tokens must be deposited into the pool in accordance with the exchange rate between the tokens of the pair that exists at the time the tokens are deposited into the pool;

2) in exchange for the placed liquidity (a pair of tokens), suppliers receive a token of the placed pair (for example, you invest WTON and WETH and receive a PAIR token) - in confirmation of the share of participation in the liquidity pool;
3) traders / buyers, through the created Swap, can exchange their tokens for other tokens within the existing pairs at the rate set in the pool of this particular exchange token pair at the time of the transaction;
4) when performing an exchange, a trader pays a commission, the amount of which is distributed among the liquidity providers of the pool in which the exchange took place.
   The commission is distributed in accordance with the shares of the liquidity providers.
5) when exchanging some tokens for others within a certain pool, their ratio within the pool changes depending on the volume of withdrawn and deposited tokens;
   * the implementation of an exchange transaction is possible in the case when the buyer of tokens in the wallet has a volume of another type of tokens of the pair sufficient for exchange, as well as to cover the commission paid to liquidity providers;
6) so that exchange transactions do not have a large impact on the value of one token in relation to another - for Swap the most favorable conditions for functioning are when:
- there are a large number of liquidity providers and buyers / traders
- exchange transactions are carried out in small amounts - relative to the formed pool of the pair's liquidity.
  But these are conditions that cannot be directly influenced.

7) It is important to describe one more of the actions carried out within the Swap:
   withdrawal by the liquidity provider of the invested tokens:
   if at a certain moment the liquidity provider decides to withdraw its tokens from the pool, then he is given a volume of tokens not equal to the initial one, but equal to its share of the total volume.

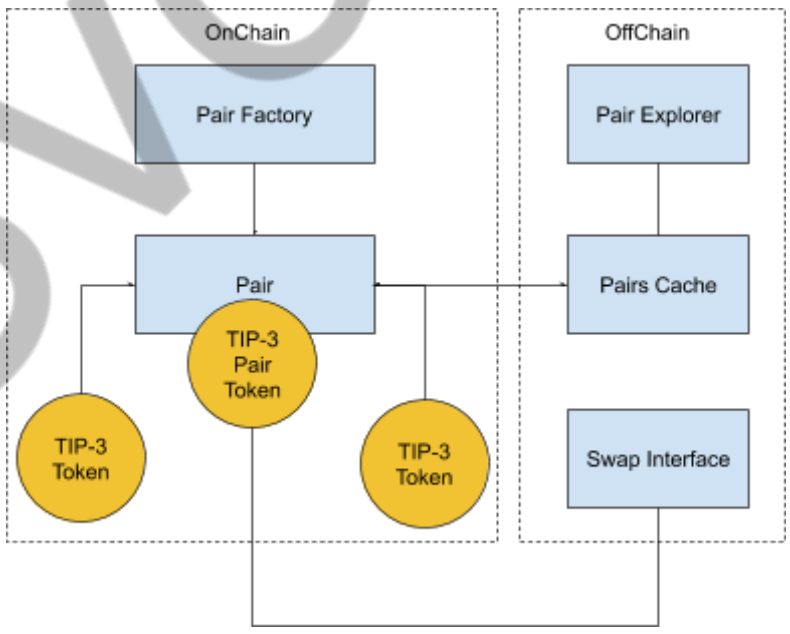
For example:
The liquidity provider N initially invests in the pool a pair of tokens - 1 WETH and 1 WBTC - based on the established rate of 1: 1.
at the time of entering the pool, 9 WETH and 9 WBTC have already been invested,
i.e. his share in the pool is 10%.
Suppose, for some time, there is a numerous exchange of some tokens for others, as a result of which we get the following ratio of the pair of tokens:
6 WETH and 20 WBTC.
If, during the time period of this established ratio, the liquidity provider N decides to withdraw its tokens from the pool, then he receives them in the amount:
0.6 WETH and 2 WBTC.

II DEX system

The proposed architecture for the implementation of a decentralized exchange (DEX) on the FreeTON blockchain using DEX pairs

1. Anyone can initiate pairing. To do this, he needs to deposit any amount of tokens, in accordance with the coefficient to create the desired exchange rate. This will be the first automatically executed order that sets the exchange rate.
2. Traders / buyers through the created DEX can exchange their tokens for other tokens within existing pairs at the rate set in the pool of this particular exchange token pair at the time of the transaction;
3. Traders place orders to purchase and exchange tokens, transferring to the contract of a pair tokens, according to the amount of placed orders
4. A trader can cancel an unfulfilled order at any time and withdrawl tokens included in the pair
5. Exchange developers can create their own wrapping contracts for pairs to set their commissions and additional functionality.

Basic structure



Pair factory

A contract that creates new contracts for liquidity pairs. Provides storing information about running pairs contracts for quick search and data collection capabilities in Pairs Cache.

Pair

A contract that implements a liquidity pair. At the entrance, it receives the addresses of two TIP-3 tokens that will participate in the exchange. It is also a TIP-3 token with additional swap-pair functionality.
When placing liquidity into a contract, the user receives a certain amount of tokens of this pair as a proof of stake and participation in providing liquidity.

The user can withdraw the invested liquidity by returning the pair tokens to the contract.

Pairs Cache

Database keeping track of all token exchanges, pairing, adding liquidity. Provides images and detailed information about tokens in exchange, meta information of tokens in pairs, exchange rates.

Pair Explorer

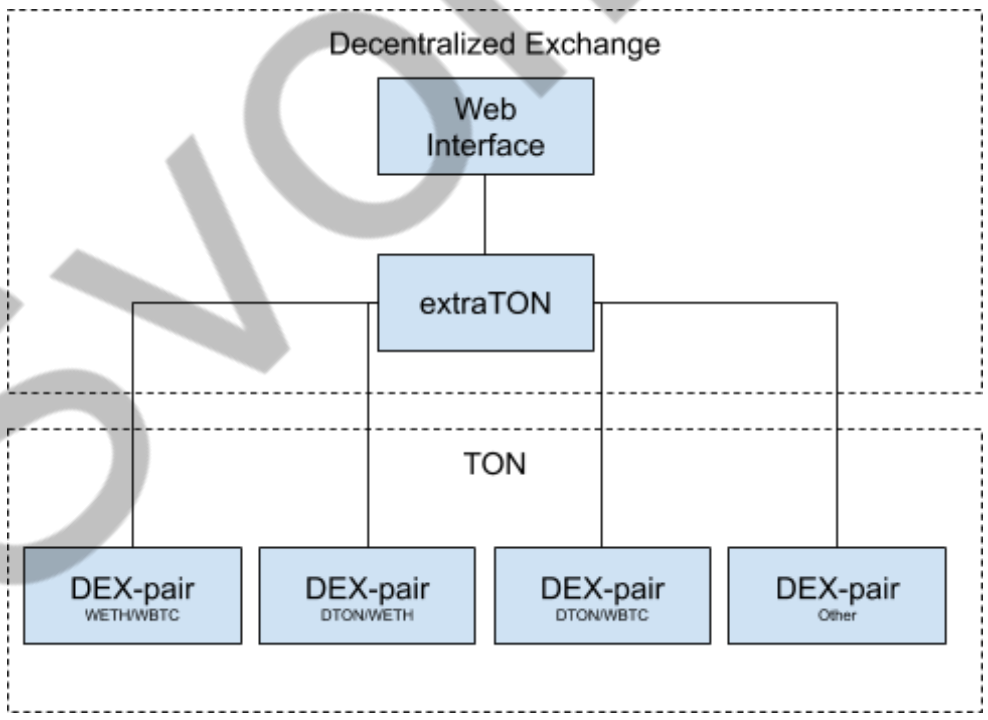
Analogue of Uniswap.info for Swap pairs and Coinmarketcap for DEX pairs. Allows you to view information about pairs, exchange rates, and the presence / absence of liquidity. The data source for Pair Explorer is Pairs Cache.

Swap Interface

The user interface interacts with the exchange contract and also provides the creation of new pairs, working through the extraTON.

DEX Interface

An interface that implements a simple decentralized exchange that interacts with DEX pairs. The functionality is similar to the classic currency exchange.



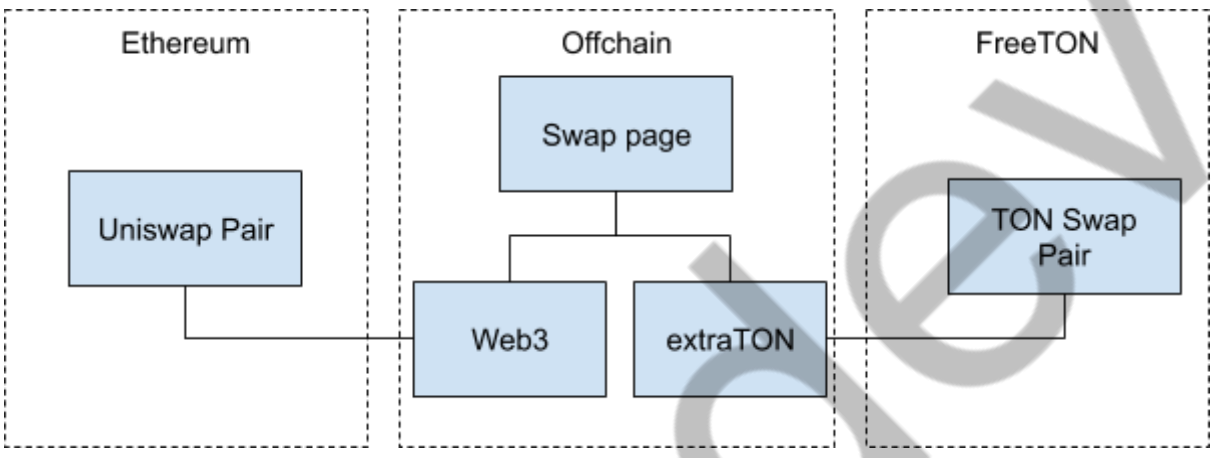
Liquidity bridges

A great way to provide a large number of liquid pairs within FreeTON is to use existing Uniswap (or similar) pairs of the Ethereum network.

In this case, the exchange of tokens can be performed using special swap contracts that implement decentralized proof of exchange. Such proof is easy to verify in a decentralized manner, and for verification it will be enough to use a Web page implemented simultaneously with a Web3 provider and extraTON or similar. The user making the exchange performs the role of the oracle of such an exchange.

To use this mechanism, you also need to modify the contract code of the Uniswap pair, or implement an additional contract that performs the exchange.

You also need to enter a trusted service (oracle) that issues ready-made digital signatures to start the translation.



How liquidity bridges work

When exchanging between different networks, analogs of one token are used, for example, WTON (Wrapped TON), while an internal analogue of WTON is issued in the Ethereum network, implemented in the form of an ERC20 smart contract of the TON token, in the FreeTON network, WTON is also used, however, implemented as TIP-3 or functionally similar to the ERC20 token contract.

Let's assume the pair WTON / WETH is used. The user exchanges 1 WTON for WETH at the rate of 1 to 2 (i.e. 2 WTON for one WETH).

The exchange procedure using the liquidity bridge is as follows:

1) User visits TONSwap page
2) The page requests the connection of the MetaMask and extraTON wallet
3) The user chooses to exchange WTON for WETH in the Ethereum network
4) The user enters the desired amount for the exchange, and clicks on the button to start the exchange
5) The page calls the approve method for the WTON specified in the contract inside TON
6) WTON is being transferred to the oracle address.
7) The oracle confirms the WTON transfer, and issues a message signed with the private key and passes it on to the user.
8) The user executes the signed Swap method from the Ethereum pair contract, passing a signed message as parameters
9) The contract makes a transfer to the user's Metamask address, while the WTONs from the oracle contract are transferred to the pair's contract

The reverse exchange is performed in a similar way.

Exchange functionality and decentralized trading bots

DEX pairs

One of the existing problems with Uniswap is its attempt to replace the mechanism of traditional currency exchanges. Uniswap offers an interesting, but not always convenient and correct approach to calculating the exchange rate of tokens. This creates certain difficulties for tokens with low liquidity and collateral, and can also create an imaginary deficit of tokens, what is also good not in all cases.

A useful addition to traditional Uniswap pairs is the introduction of “DEX pairs”, which work in a similar way to orders on financial exchanges.

Such pairs provide a public interface for creating and resolving trade orders for other contracts, as well as for any external graphical interfaces.

Universal interface for creating exchanges

Direct exchange pairs will allow the creation of a large number of decentralized exchanges (DEX), without the need to re-develop the mechanism for placing orders and their resolution.
Exchange interface, additional functionality, marketing materials, etc. can be developed by independent developers. At the same time, trading in pairs in the interfaces will be synchronized between all exchanges.

Bot contracts

The creation of a universal common interface allows you to create contracts that perform automated currency exchange, according to the algorithm, in other words, decentralized trading bots. For such bots to work, contracts must be able to process messages originating from the pair's contract, or run at regular intervals using the Tick-Tock contract.

Decentralized governance of bot contracts

Also, the governance of such bots can be performed using a centralized organization (DAO) or semi-centrally, for example, using TON Subgovernance.

Scaling

In an exchange like this, transaction costs will increase as the number of orders increases. Also, there is an upper speed limit for the main chain of the FreeTON network. For scaling in such cases, TON offers one of the mechanisms for creating a dedicated chain - Workchain.

Scaling DEX pairs using Workchain can be done in two ways:

1. Creation of an additional Workchain with trading contracts associated with the pair contract in the main chain and performing the resolution of orders within the workchain. At the same time, such contracts perform periodic placement and withdrawal of orders in the contract of the main pair with a low frequency. This allows you to reduce the commission for recording and storing data in the main chain.
2. Creation of an isolated Workchain with its own DEX pairs. At the same time, in such pairs, one more abstraction is created over the token, for example, WrappedWrappedTON

Economic model for exchanges based on DEX pairs

DEX pairs allow any external developer to create their own interface and wrapper around the decentralized exchange.

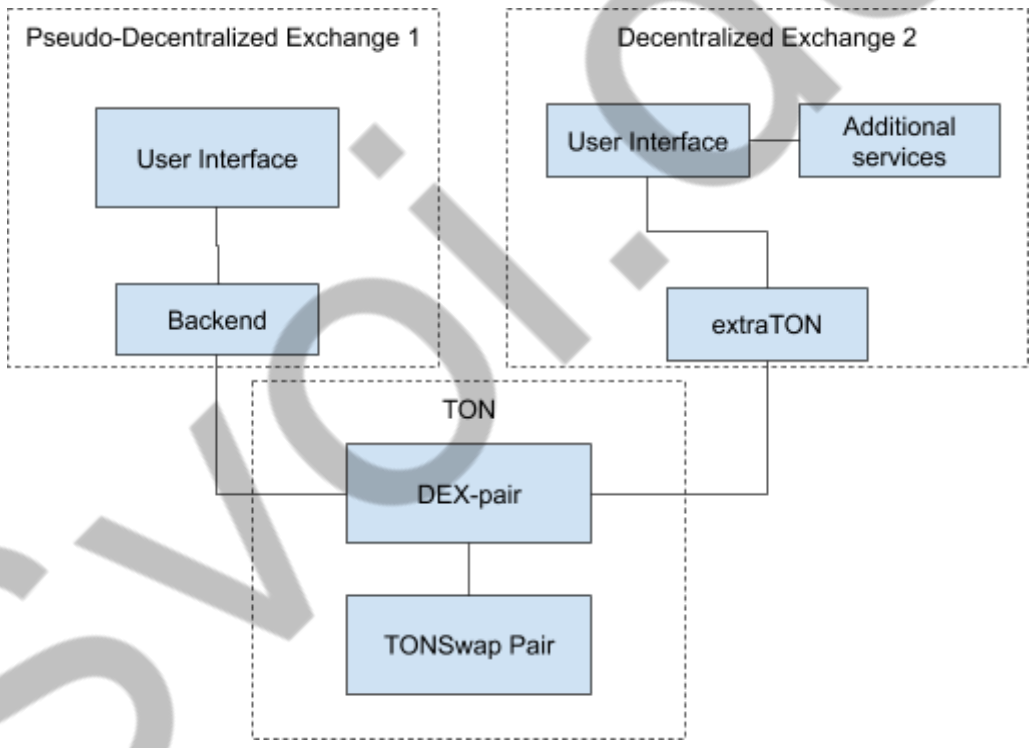
Each DEX-pair has a well-known ABI, with the help of which external web / standalone applications can display the currency rate in a pair, place and withdraw orders.

At the same time, the development of functional remains at the discretion of the developer:

1) Token purchases
2) Withdrawing tokens to other systems
3) Automated trading
4) Display ads
5) Development of a user-friendly interface
6) Charging commissions

Exchanges based on DEX pairs are free of the following disadvantages:

1) Insufficient liquidity at the start of the exchange
2) Few orders and participants
3) Hot Funds Security and Storage Issues



YIELD Farming

One of the most popular liquidity maintenance mechanisms on the market today is rewarding users with project tokens for freezing finances or for providing liquidity for an exchange in exchange pairs.

TONSwap provides a reward with a TOS token (TONSwap) for ensuring the liquidity of the pair for a long time.

In addition, part of the pairs at the start will have a reward in TON Crystal, which will further stimulate the flow of liquidity to the TON network.

Contact information

Andrey Nedobylsky

CTO of SVOI.dev development labs.

Email: cto@svoi.dev
GitHub: https://github.com/lailune
Telegram: @lailune
FreeTON Forum: https://forum.freeton.org/u/lailune/summary