Lesson 11 - Defi

Checking the status of the test networks

See status

U256 review

Library
This has a struct to hold the values and 2 operations on the values

The value is split into 2 parts high and low with
Low = least significant u251, High. =. most significant u251

We need the implicit argument `range_check_ptr` for the functions.
Functions include

- uint256_check
- uint256_add
- uint256_mul
- uint256_sqrt
- uint256_lt
- uint256_le
- uint256_unsigned_div_rem
  See the repo for others

Example of using Uint256 in Cairo

```
%builtins output range_check

from starkware.cairo.common.uint256 import (uint256_add, Uint256,
    uint256_mul)
from starkware.cairo.common.serialize import serialize_word

func main{output_ptr : felt*, range_check_ptr}(){
    alloc_locals;
    local num1 : Uint256 = Uint256(low=0,high=10);
    local num2 : Uint256= Uint256(low=0,high=3);
    let (local mul_low : Uint256, local mul_high : Uint256) =
uint256_mul(num1, num2);
    serialize_word(mul_high.low) ;

    return ();
}
```

Introduction to DeFi

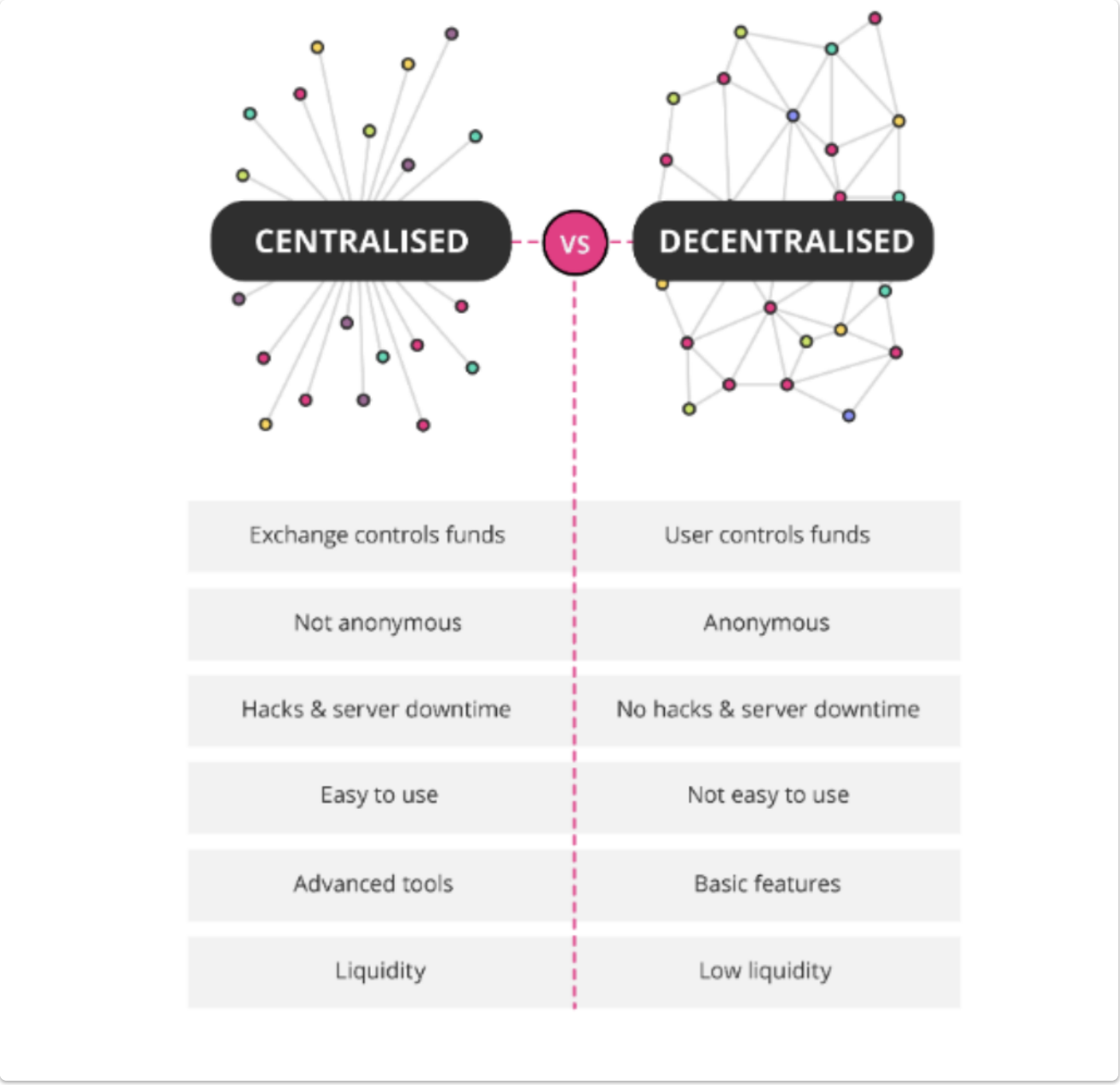
“ Decentralized Finance aims to provide the same financial services as traditional banking without any central authority or intermediaries. Without a central authority, DeFi allows everyone to engage with financial services like payments, lending, borrowing or investing with high autonomy and fewer barriers. “

Areas

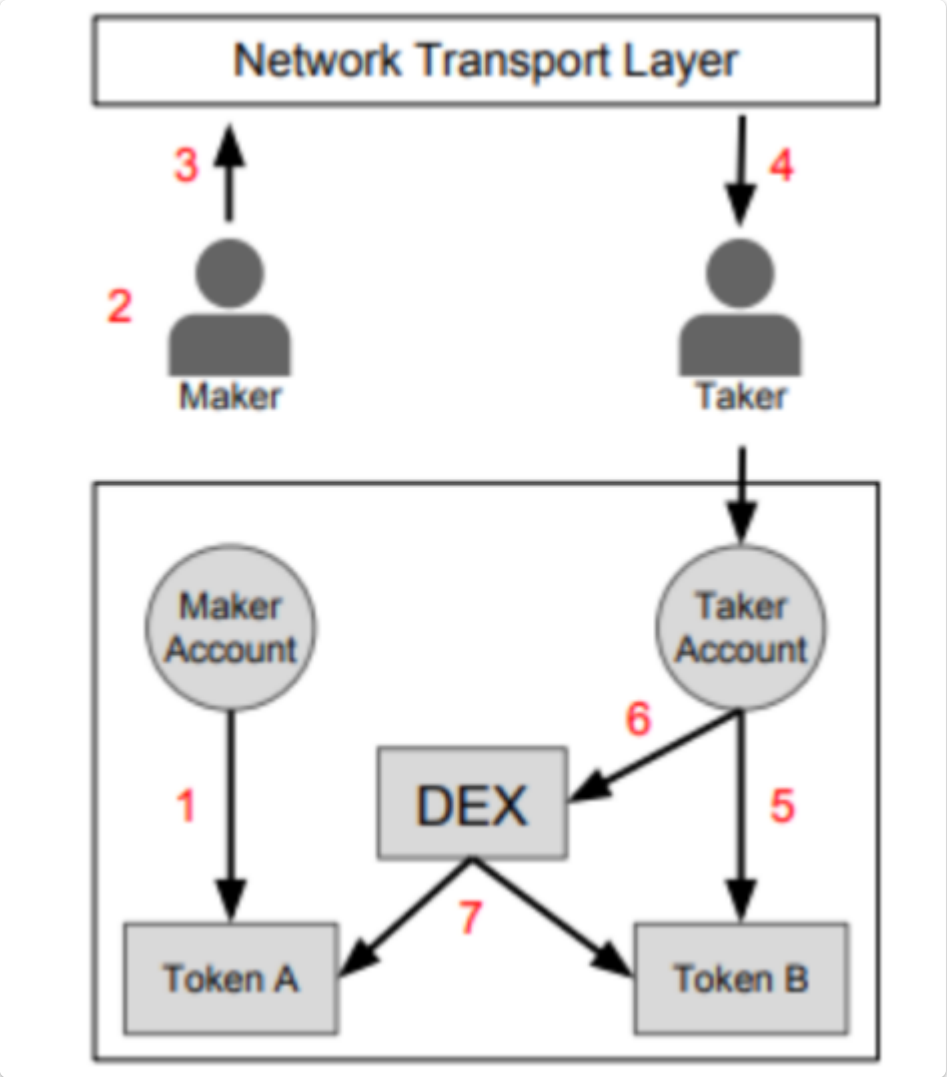
- Exchanges
- Asset management
- Stablecoins
- Lending / Borrowing
- Remittance

Decentralised Exchanges

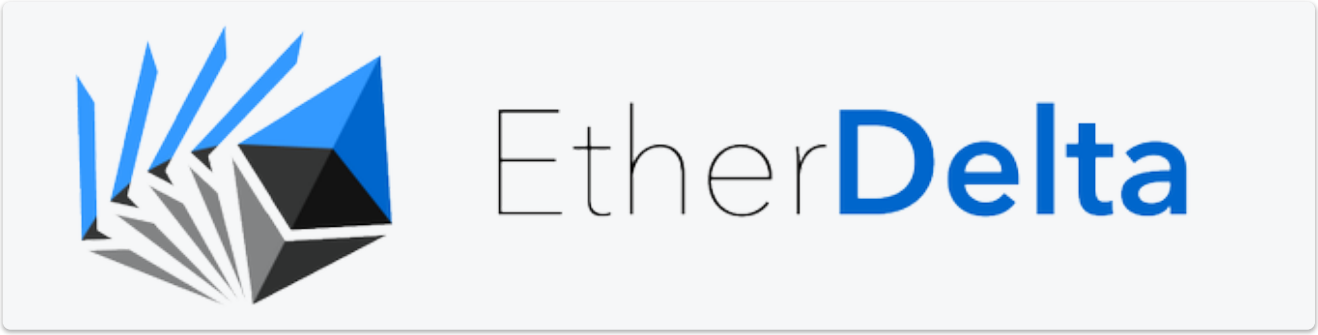
Decentralised Exchanges are a protocol to provide asset exchange without the platform holding the users assets
Vitalik "centralised exchanges go burn in hell as much as possible"



EARLY EXCHANGES



1. Maker approves the decentralized exchange (DEX) contract to access their balance of Token A.
2. Maker creates an order to exchange Token A for Token B, specifying a desired exchange rate, expiration time (beyond which the order cannot be filled), and signs the order with their private key.
3. Maker broadcasts the order over any arbitrary communication medium.
4. Taker intercepts the order and decides that they would like to fill it.
5. Taker approves the DEX contract to access their balance of Token B.
6. Taker submits the makers signed order to the DEX contract. 7. The DEX contract authenticates makers signature, verifies that the order has not expired, verifies that the order has not already been filled, then transfers tokens between the two parties at the specified exchange rate.



DECEMBER 2017 ETHER DELTA IS ATTACKED

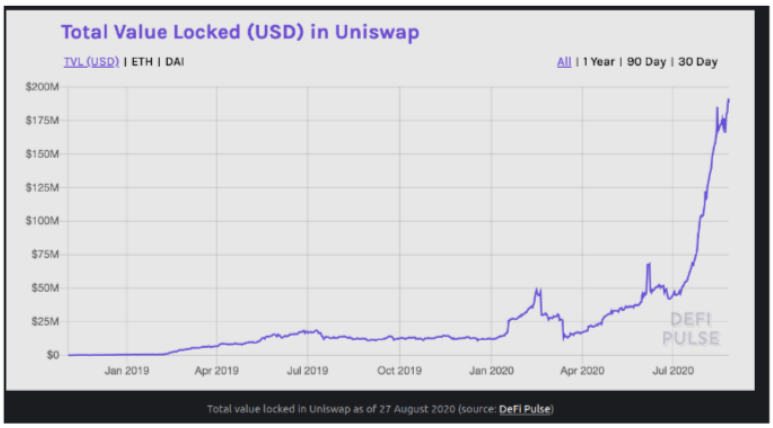
The DNS for Ether Delta is redirected to a fake site
Many people send tokens to this site thinking it is genuine
308 ETH stolen

Uniswap

The first ideas came from Vitalik, Nick Johnson and Martin Koppelmann in 2016 in a Reddit post

It was followed by an implementation from Hayden Adams and launched in Nov 2018

- Launched in 2018, Uniswap is a DEX featuring an AMM
- Solves the problem of illiquid assets since anyone can set up a liquidity pool



- Truly Decentralised
- Allows swap between any ERC20 pairs
- The code is robust

V2 Launched May 2020 allowing direct token swaps - halving gas fees

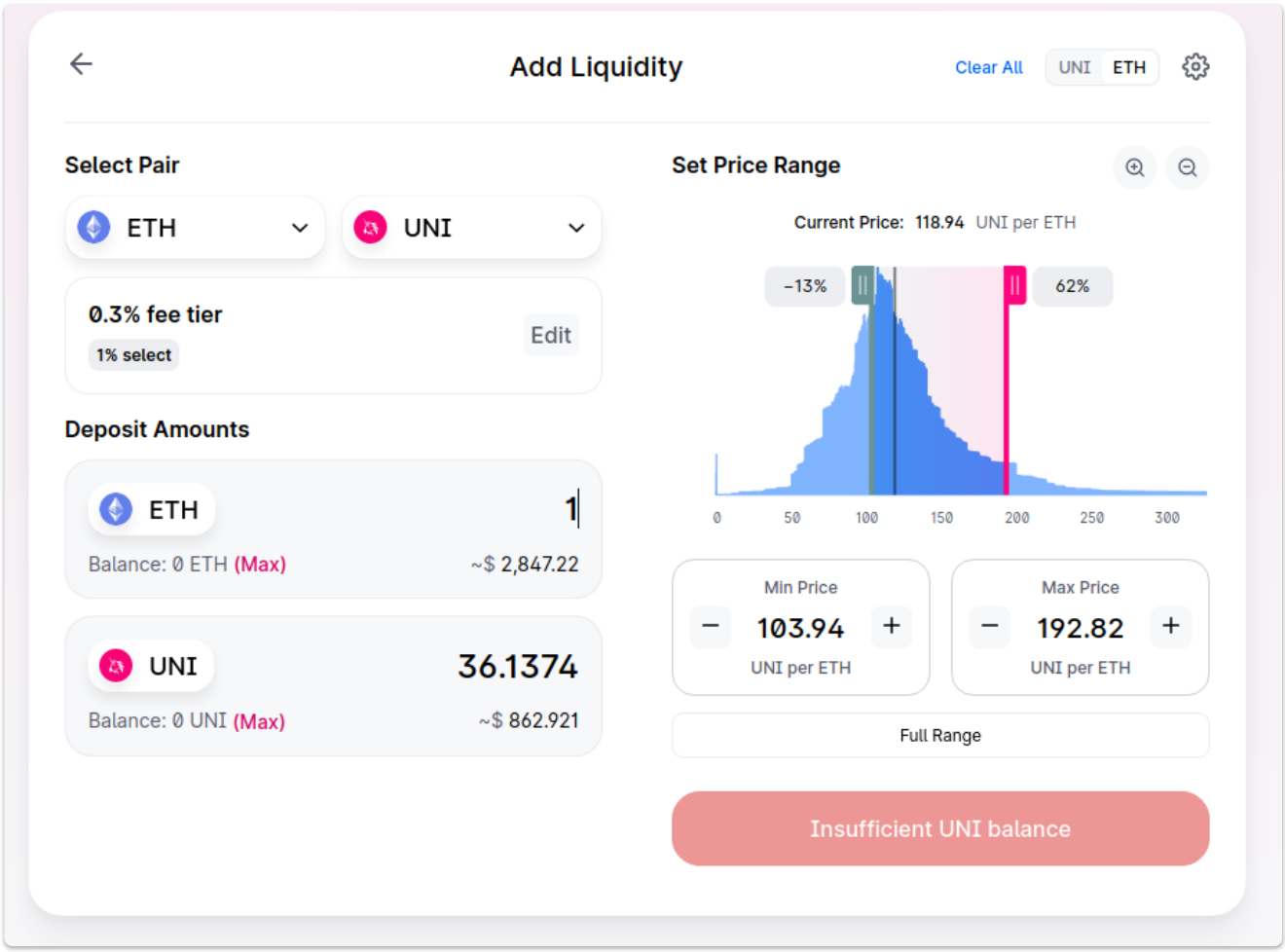
It solved many of the problems of the initial exchanges such as lack of incentives to provide liquidity for rarely traded assets.
It relies on a smart contract acting as an automatic market maker (AMM)

INCENTIVISING USERS

- Users deposit funds into a liquidity pool, for example ETH and USDT
- This pool (a token pair) allows users to exchange tokens
- Interacting with the exchange incurs fees
- These fees are paid to the liquidity providers

The AMM is more specifically a constant function market maker.

The term “constant function” refers to the fact that any trade must change the reserves in such a way that the product of those reserves remains unchanged (i.e. equal to a constant).


Add Liquidity
Clear All
UNI
ETH
Select Pair
ETH
UNI
0.3% fee tier
1% select
Edit
Deposit Amounts
ETH
1
Balance: 0 ETH (Max)
~$ 2,847.22
UNI
36.1374
Balance: 0 UNI (Max)
~$ 862.921
Set Price Range
Current Price: 118.94 UNI per ETH
-13%
62%
0
50
100
150
200
250
300
Min Price
103.94
UNI per ETH
Max Price
192.82
UNI per ETH
Full Range
Insufficient UNI balance

LP Tokens

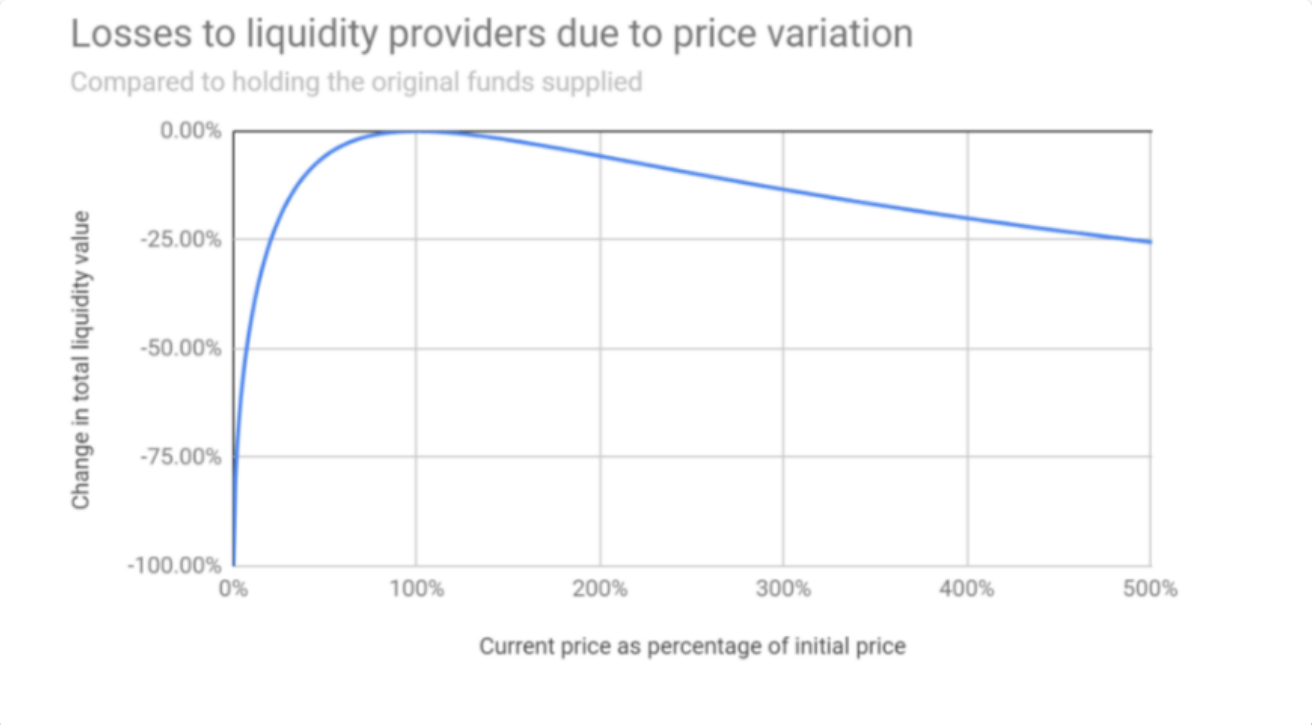
Typically the liquidity provider receives LP tokens when they add liquidity, say ETH and USDT

Later they can take liquidity by providing LP tokens to the contract and will receive back ETH and USDT. Ideally they will make a profit

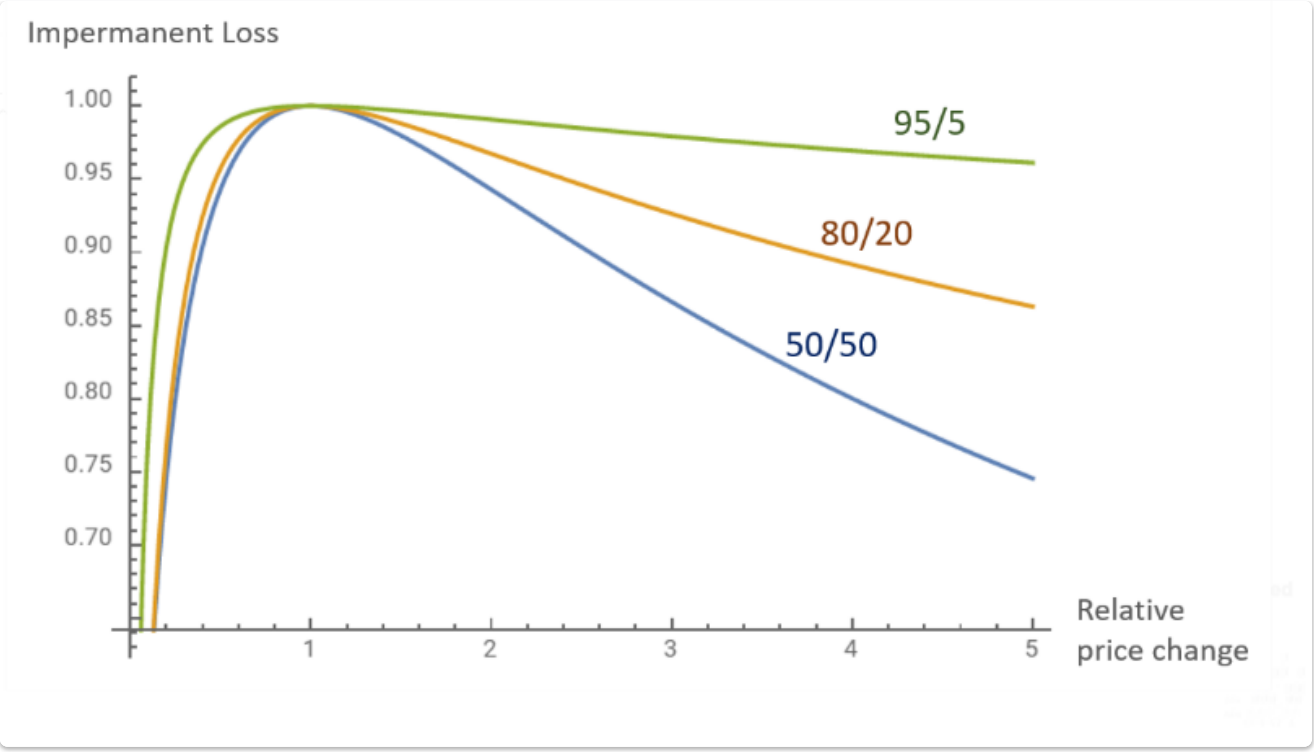
RISKS WHEN PROVIDING LIQUIDITY

- Slippage
  Large trades can move the price

- Impermanent loss
  As a result of volatility



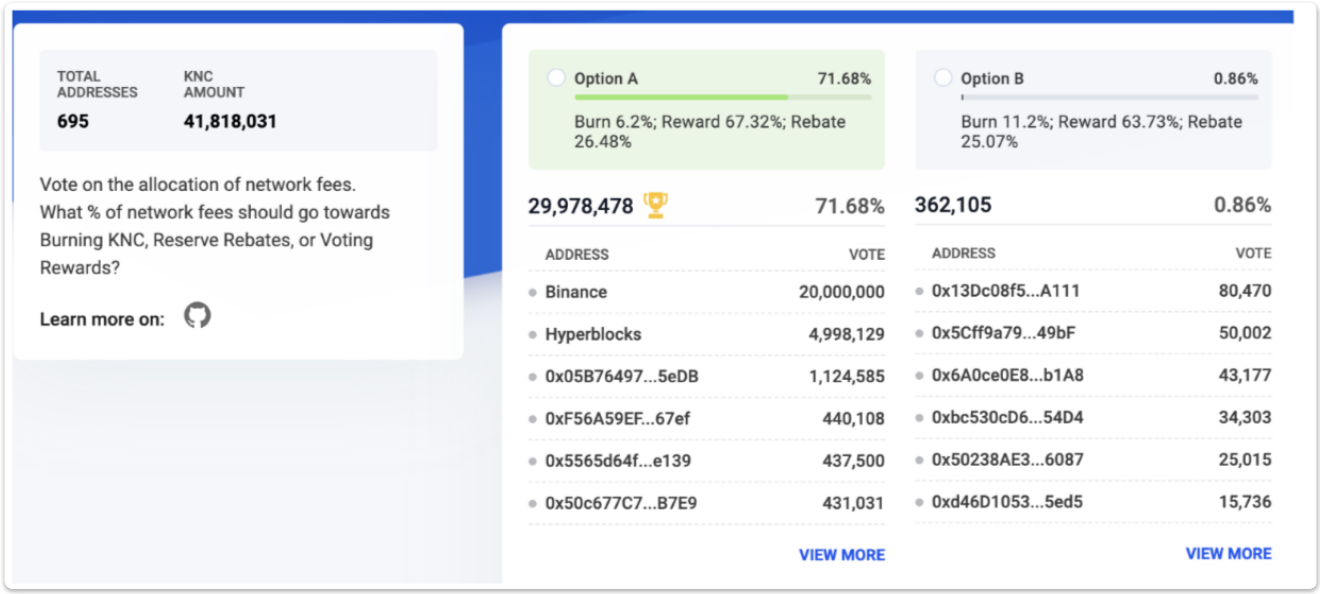
While liquidity providers can use stablecoins, yields, and rewards to help lessen the impact of impermanent loss they can also reduce this by using liquidity pools that use ratios other than 50/50. Balancer is a platform that offers liquidity pools with ratios like 60/40 or 80/20. When ETH is deposited into a pool that is 50/50 the liquidity provider has to have 50% exposure to another token. With an 80/20 pool, they only need 20% exposure to another token. You can see below how three liquidity pool ratios are affected by impermanent loss differently, with the 95/5 pool seeing the least impermanent loss.


Impermanent Loss
1.00
0.95
0.90
0.85
0.80
0.75
0.70
1
2
3
4
5
95/5
80/20
50/50
Relative
price change

Governance and governance tokens

Holding the token gives the holder the right to vote on aspects of the protocol, typically economic settings, inclusion of assets

The tokens may have a yield

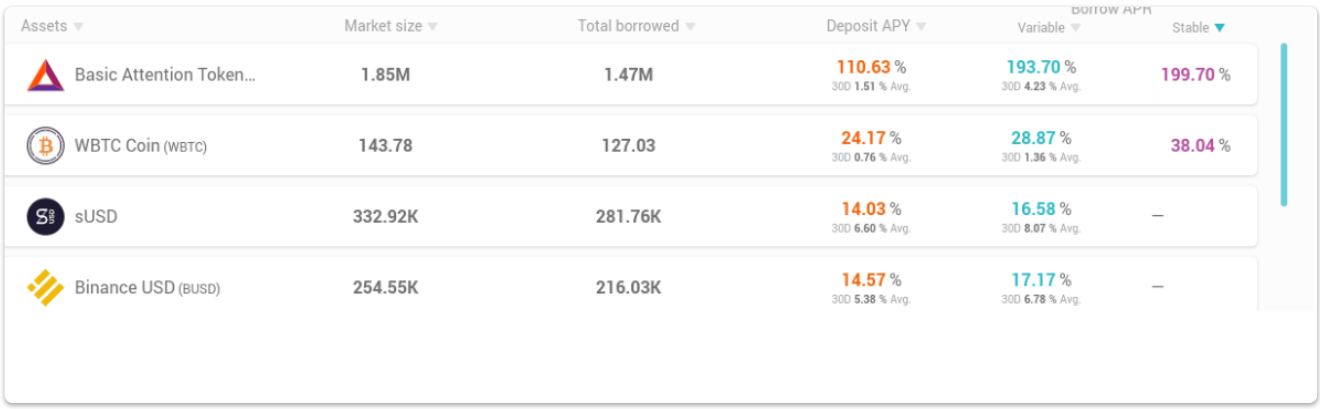


Yield Farming

Yield Farming at its simplest is a means of earning rewards for depositing tokens
Users are rewarded for providing liquidity
Different strategies are used by investors to maximise their rewards from the many DeFi projects
Compound and yearn.finance introduced this area to DeFi

The first Yearn product was a lending aggregator. Funds are shifted between dYdX, AAVE, and Compound automatically as interest rates change between these protocols

June 2020 BAT token APY

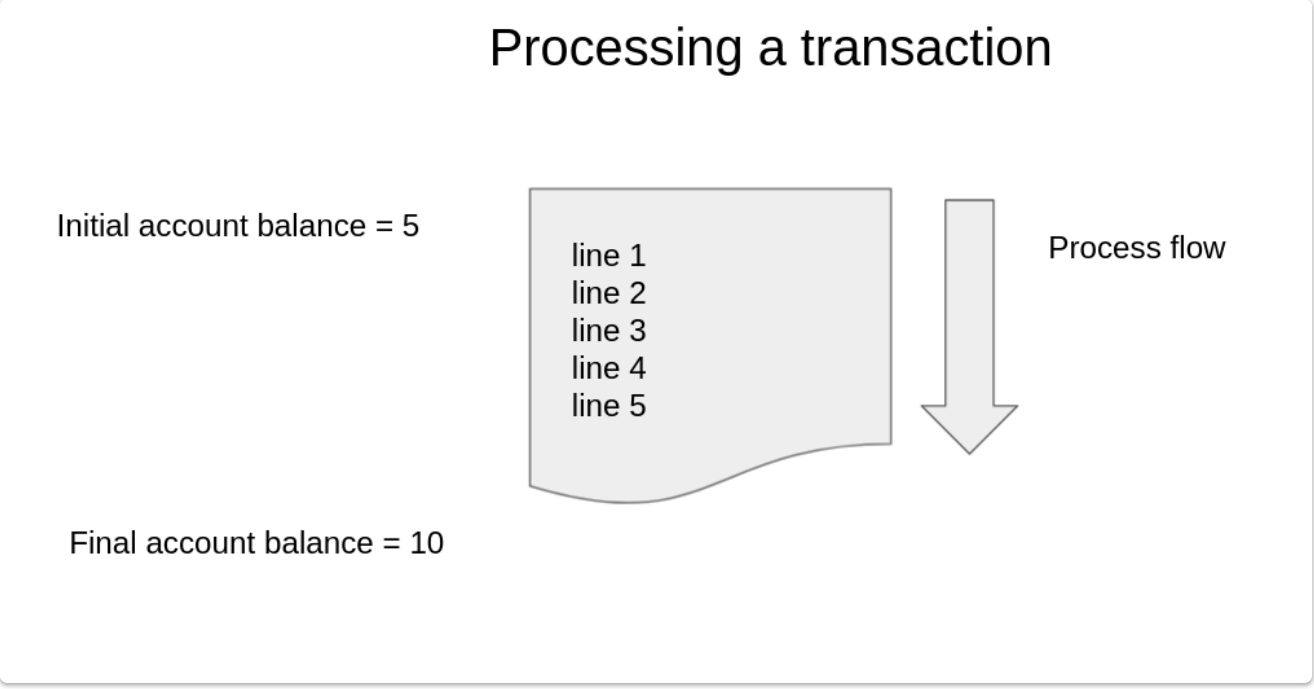


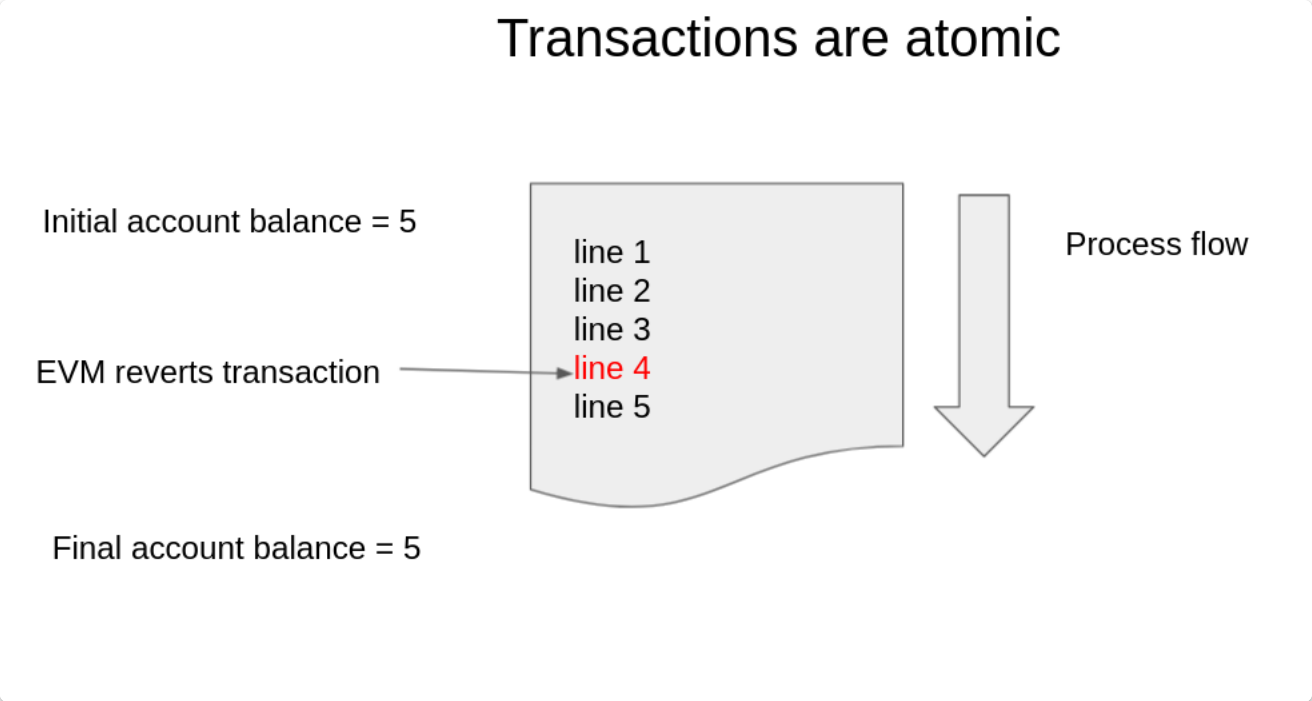
Aave and flash loans

An innovative financial product

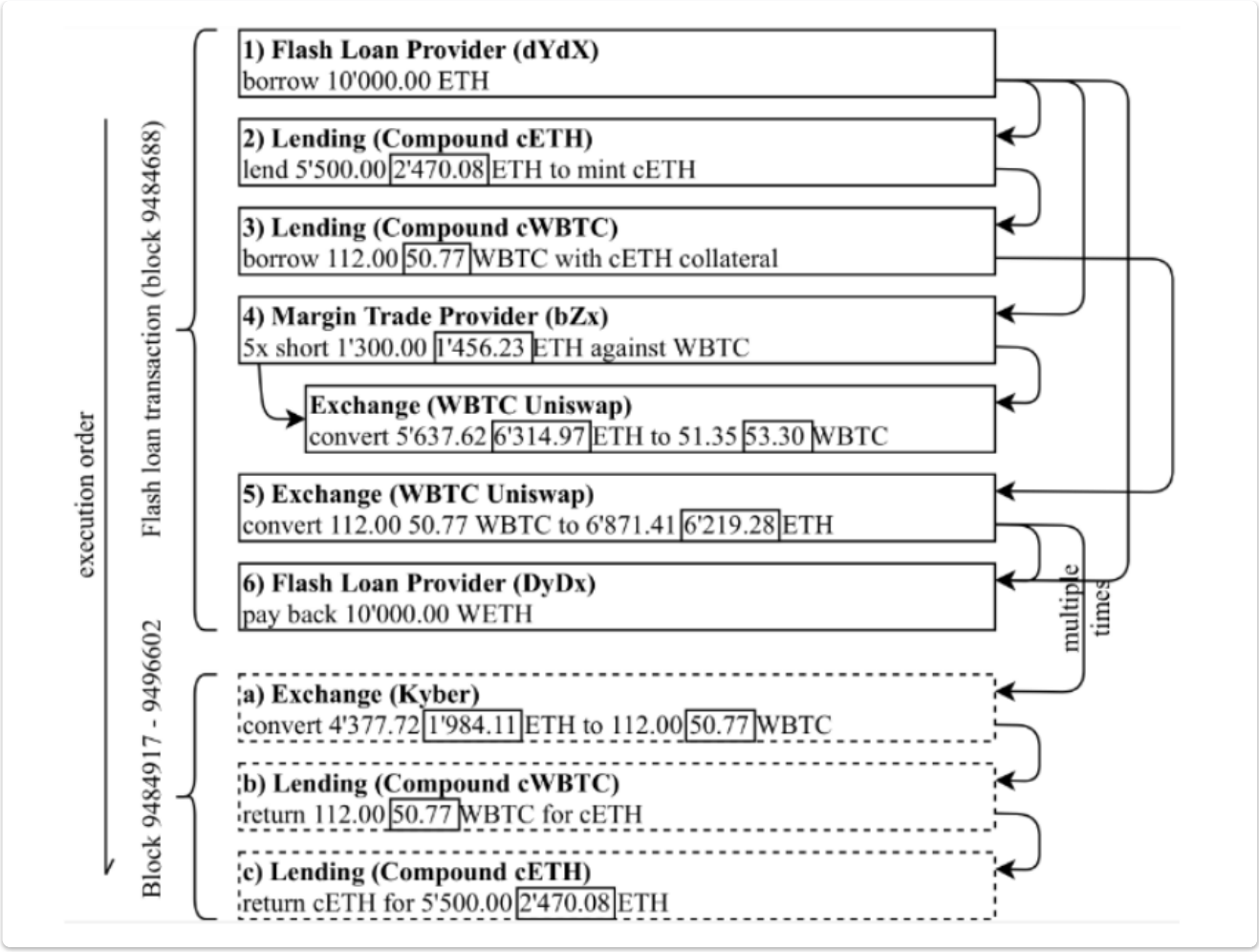
Does a risk free loan with no collateral required, of virtually any value , with an extremely low fee (0.09 %) seem to good to be true ?

Imagine that line 2 in this contract increases the account balance by 5





Attacking DeFi with flash loans


execution order
Flash loan transaction (block 9484688)
Block 9484917 - 9496602
1) Flash Loan Provider (dYdX)
borrow 10'000.00 ETH
2) Lending (Compound cETH)
lend 5'500.00 2'470.08 ETH to mint cETH
3) Lending (Compound cWBTC)
borrow 112.00 50.77 WBTC with cETH collateral
4) Margin Trade Provider (bZx)
5x short 1'300.00 1'456.23 ETH against WBTC
Exchange (WBTC Uniswap)
convert 5'637.62 6'314.97 ETH to 51.35 53.30 WBTC
5) Exchange (WBTC Uniswap)
convert 112.00 50.77 WBTC to 6'871.41 6'219.28 ETH
6) Flash Loan Provider (DyDx)
pay back 10'000.00 WETH
multiple times
a) Exchange (Kyber)
convert 4'377.72 1'984.11 ETH to 112.00 50.77 WBTC
b) Lending (Compound cWBTC)
return 112.00 50.77 WBTC for cETH
c) Lending (Compound cETH)
return cETH for 5'500.00 2'470.08 ETH

DeFi on Starknet

See the ecosystem page for an overview of projects

Uniswap

See announcement from Nethermind
See Unistark repo
We will look at this in more detail when we look at warp.

Aave

See the aave-starknet project repo
Phase 1 announcement of the completion of the Aave / Starknet bridge

The system allows the following:

- Liquidity providers can “bridge” their Aave v2 Ethereum aTokens via the Aave <> StarkNet bridge to/from StarkNet.
  While being on StarkNet, the representation of the aTokens there keeps accruing the yield of Aave on Ethereum, but also allows the liquidity provider to for example “sell” them to Starknet users for a premium, or even use them in one of the Starknet DeFi applications that are continuously appearing.
- StarkNet users (mainly those holding assets on the network) are able to “buy” the StarkNet aToken representations, not being submitted to transaction costs of Ethereum. And by holding them in their wallet, they accrue yield.
- If any AAVE rewards program would be active on Aave v2 Ethereum, the system allows holders of aTokens on StarkNet to accrue those AAVE rewards over time, and claim AAVE on Ethereum, whenever they decide to.

ZKX

See blog

ZKX is building a protocol that allows trading asset derivatives on StarkNet.
They are introducing an “Adaptive Balancing Rate” which is intended to give a rate that adapts quickly in volatile markets.

- Swap Liquidity Mining
  This incentivises participation and introduces some gamification into the product in order to increase the overall volumes.

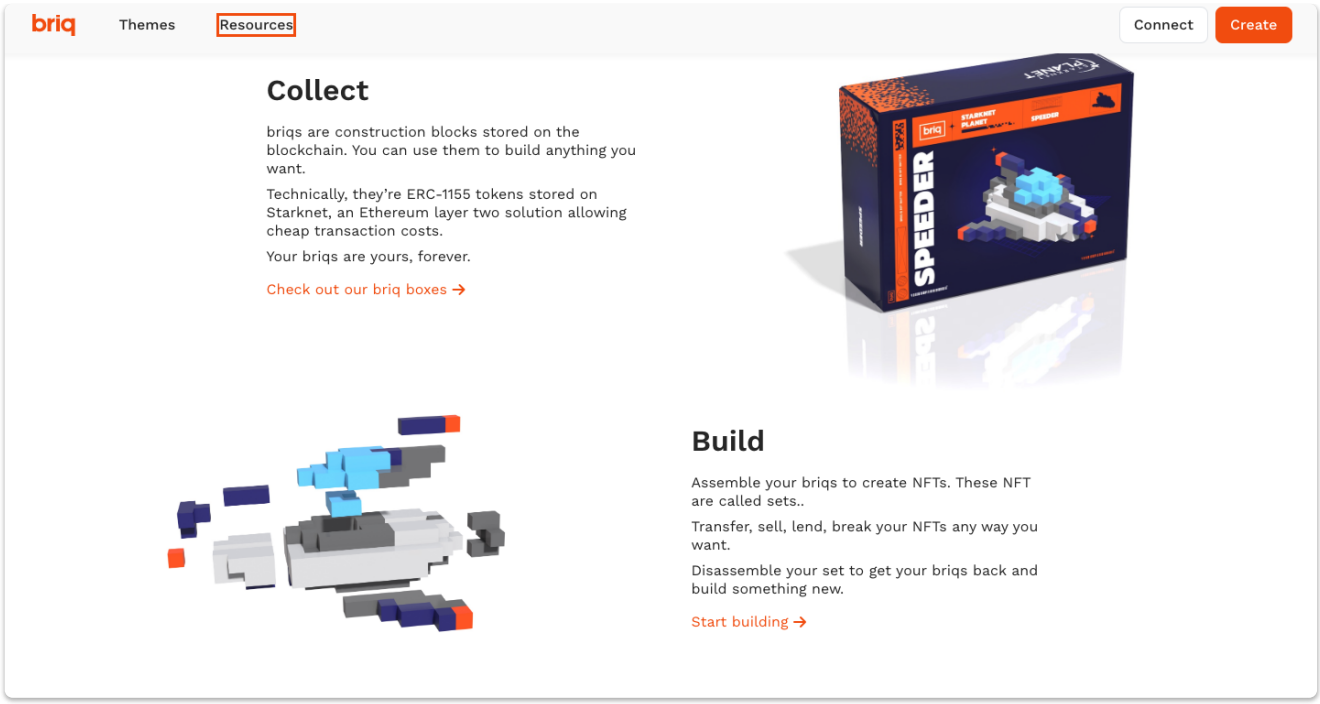
- T-Swaps
  These are options that allow profits when the market is volatile or moving lower.

- Decentralised Limit Order Book (DLOB)
  "In one sentence, the decentralised limit order book enables the trader to work in a fast-paced environment. What’s more important for us, we run on the principle of decentralised and permissionless. And our order book is completely decentralised and not controlled by anyone"

- Liquid Governance
  As a reward for your participation in the protocol you are given governance shares that allow you to vote on how the protocol is governed.

Briq

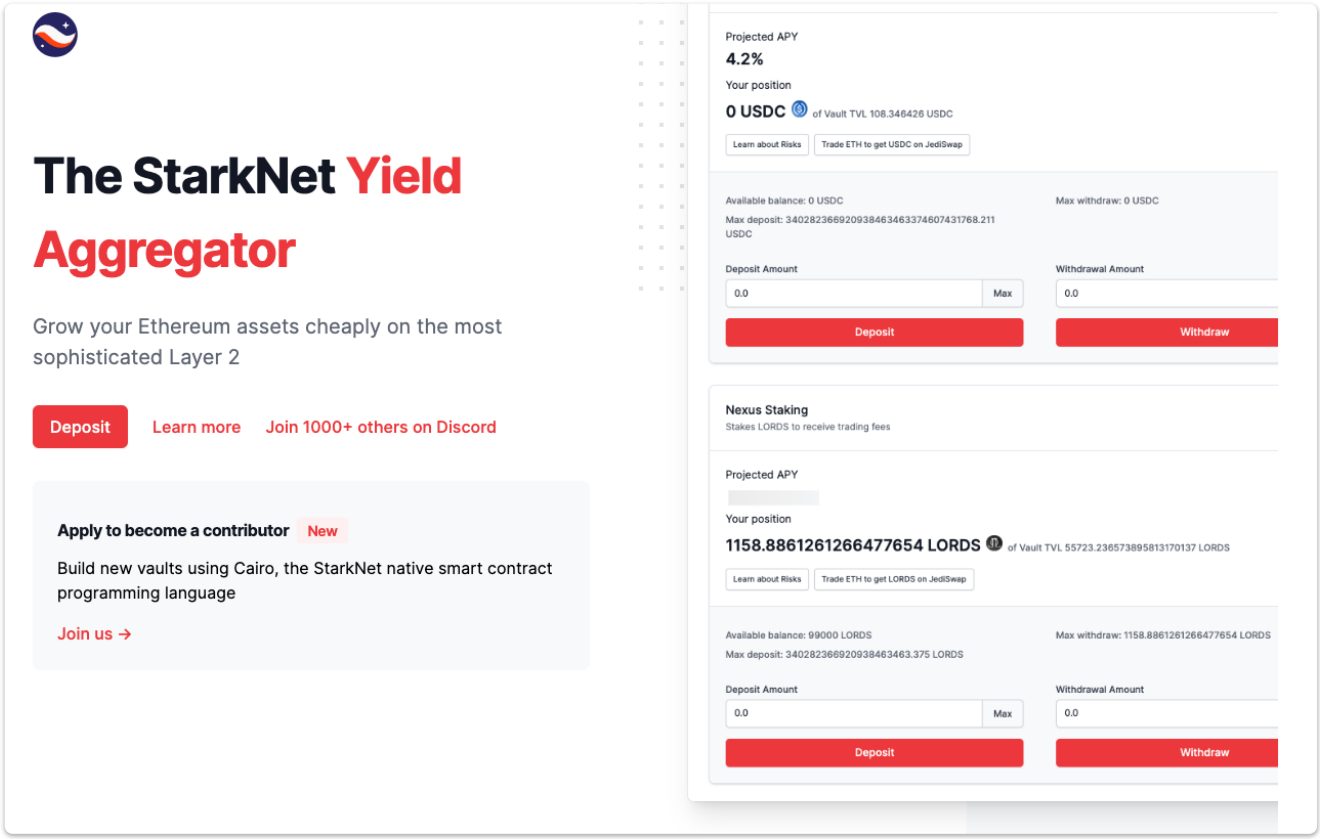
"Briq is NFT matter"
"We want to make NFTs more composable, interoperable, and on-chain. We want NFTs to swoosh seamlessly from one game to another, to be the backbone of the metaverse. We want briq to be a composability system to give NFT matter and easily compose them."



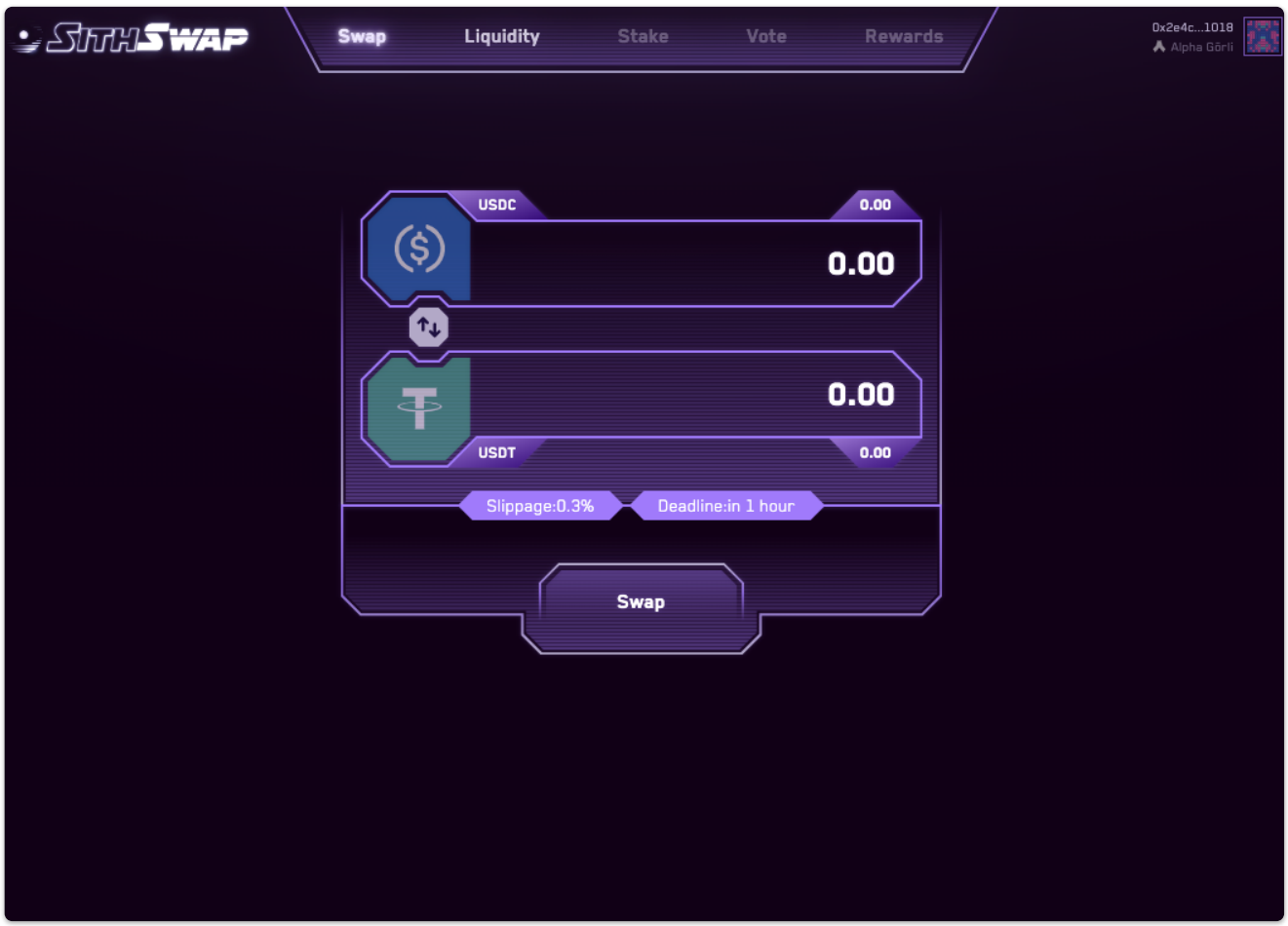
"You can mint briqs, build a set with your briqs, transfer your set to someone, disassemble a set to get the briqs back and build something new.

Anything built out of briqs is an NFTs. You can think of briq as NFT building blocks."

Yagi Finance



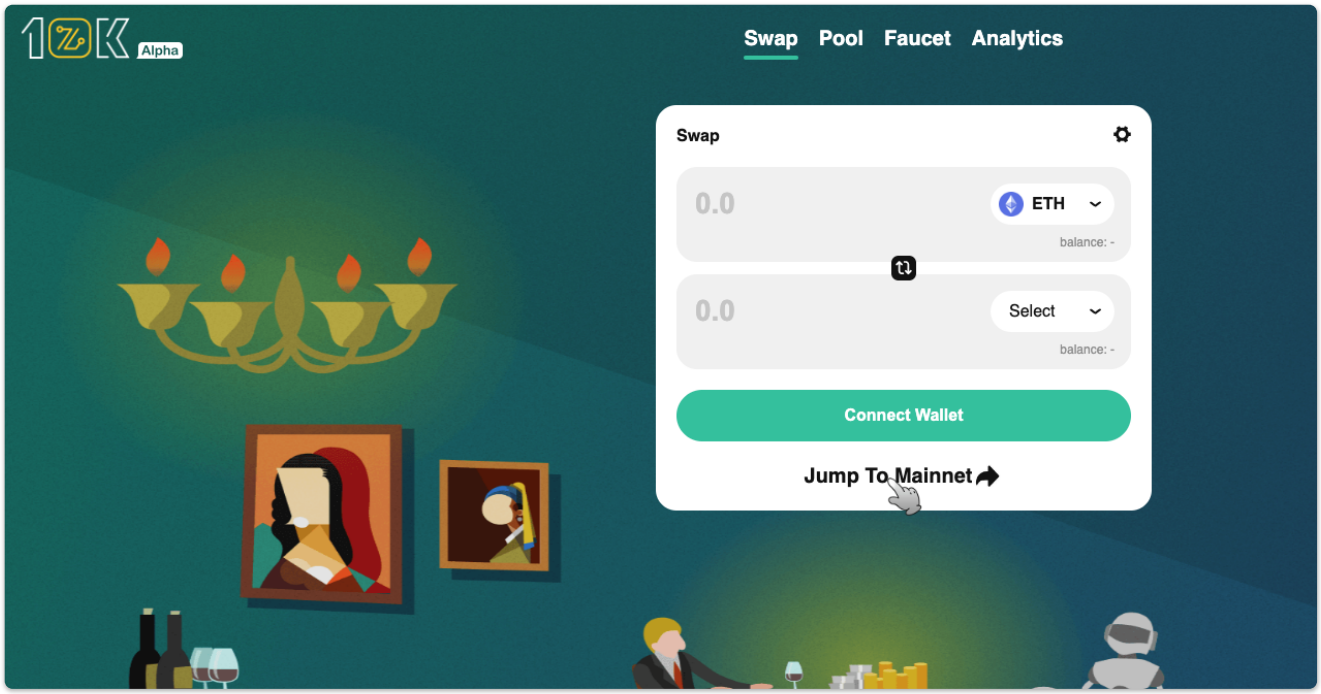
Sith Swap



10kSwap

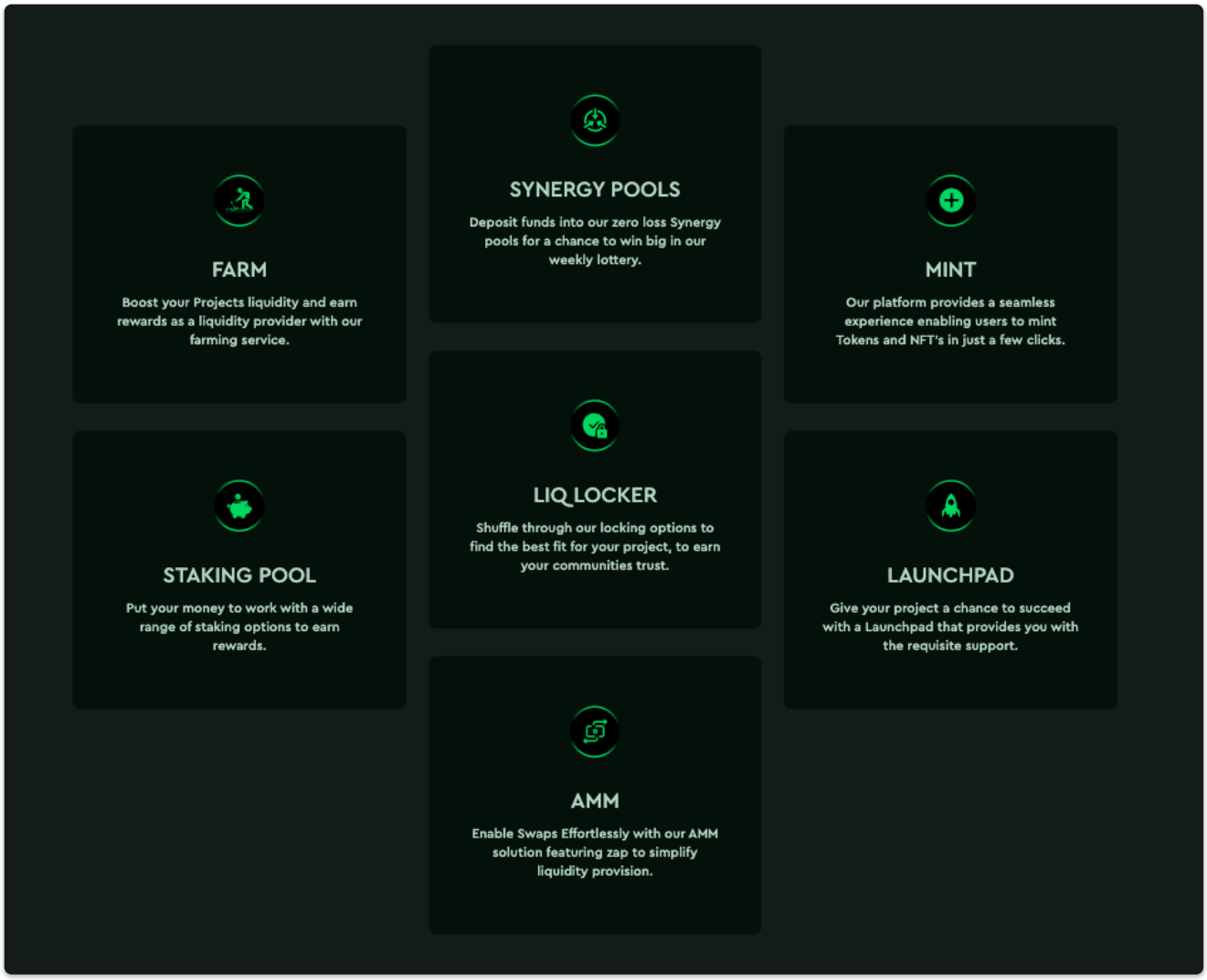
10K Swap is an automatic market maker

See app on goerli
See github



Stark DeFi

A DeFi Solutions Hub



Astraly

Astraly is a fundraising and community building platform. Buy ASTR tokens, stake them and receive lottery tickets to invest in the listed projects.

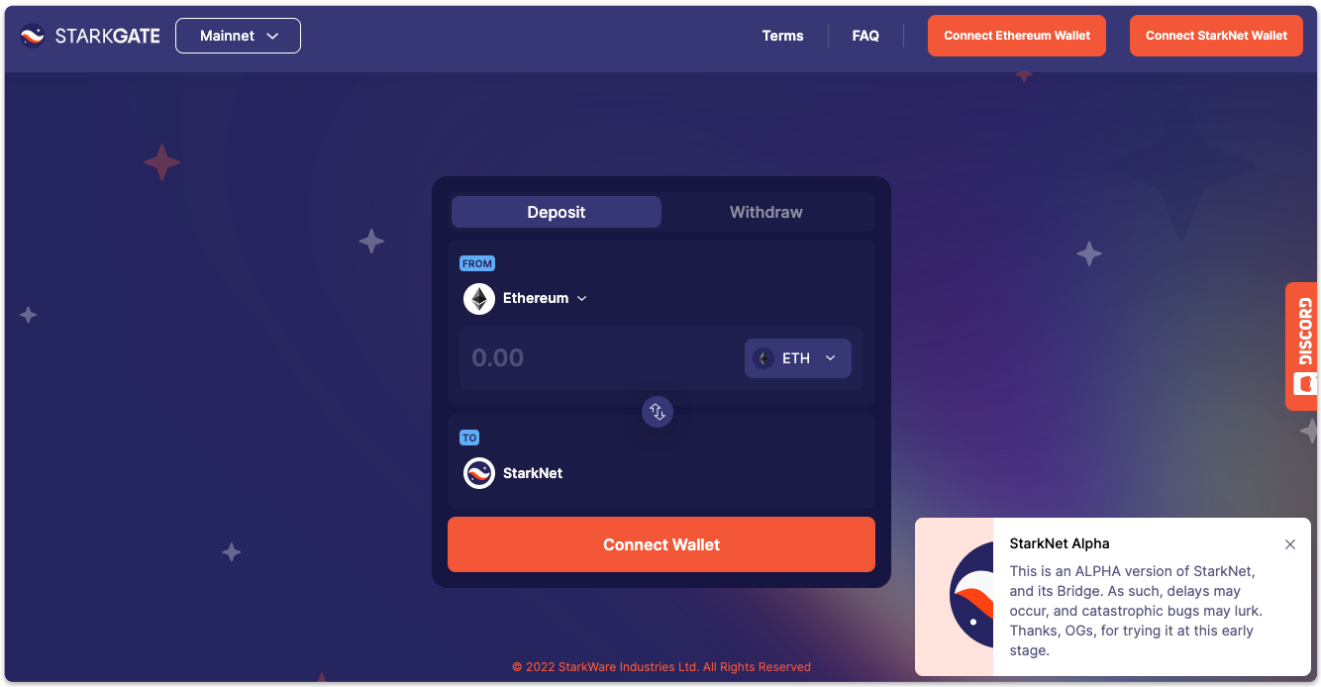
app on goerli
github

Flashloans on Starknet

See Repo

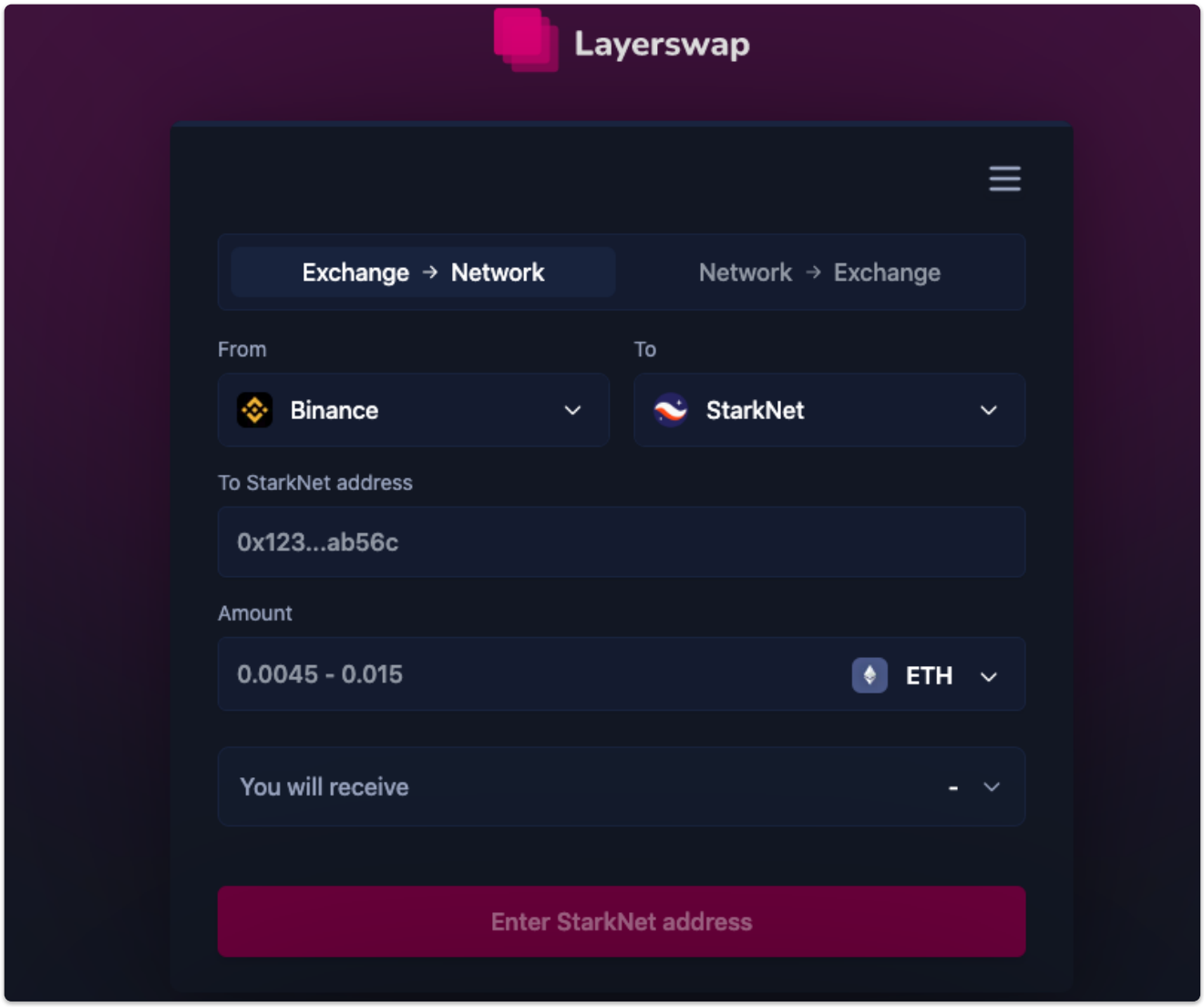
Bridges on Starknet

Starkgate

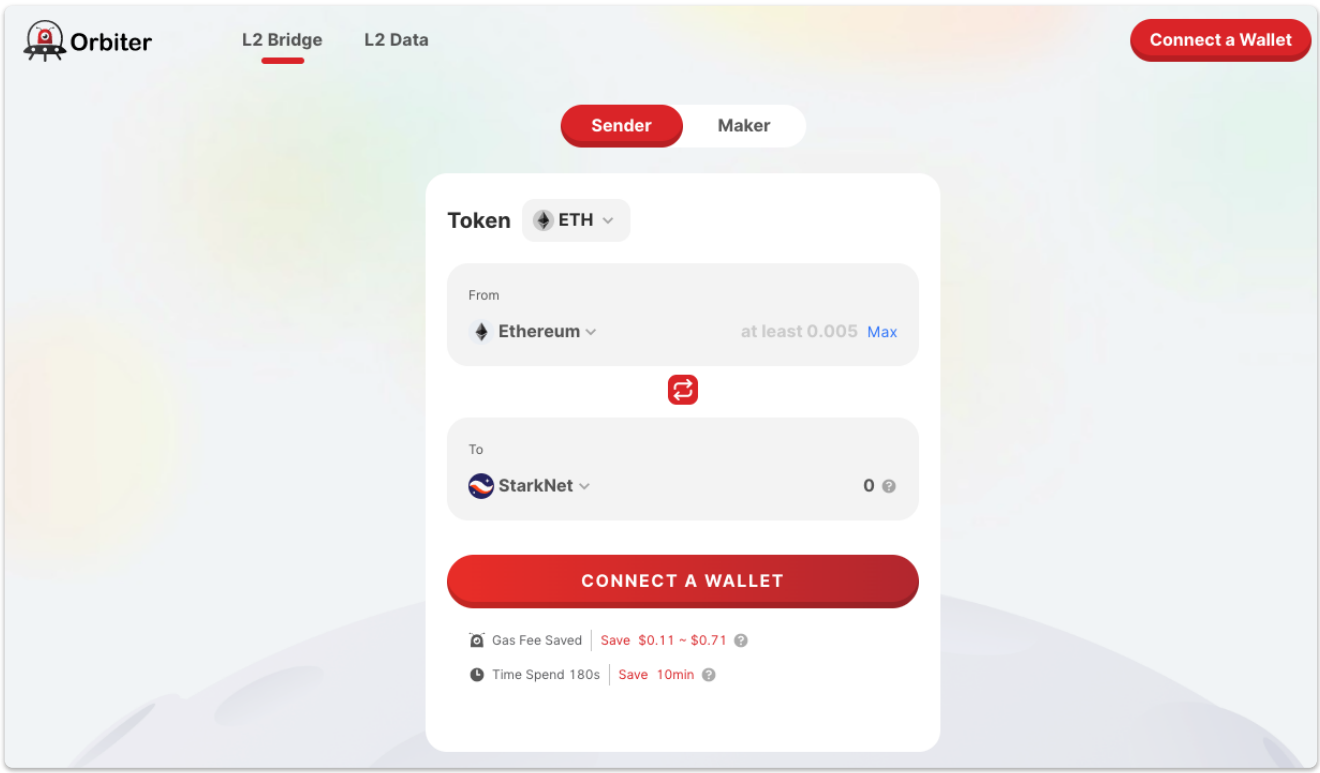


Layerswap

Layerswap allows connection between exchanges and Starknet



Orbiter



MakerDAO Starknet DAI Bridge

App on goerli
Github

StarkEx

See Docs

StarkEx allows self-custodial trading and payment transactions for applications such as DeFi and gaming.

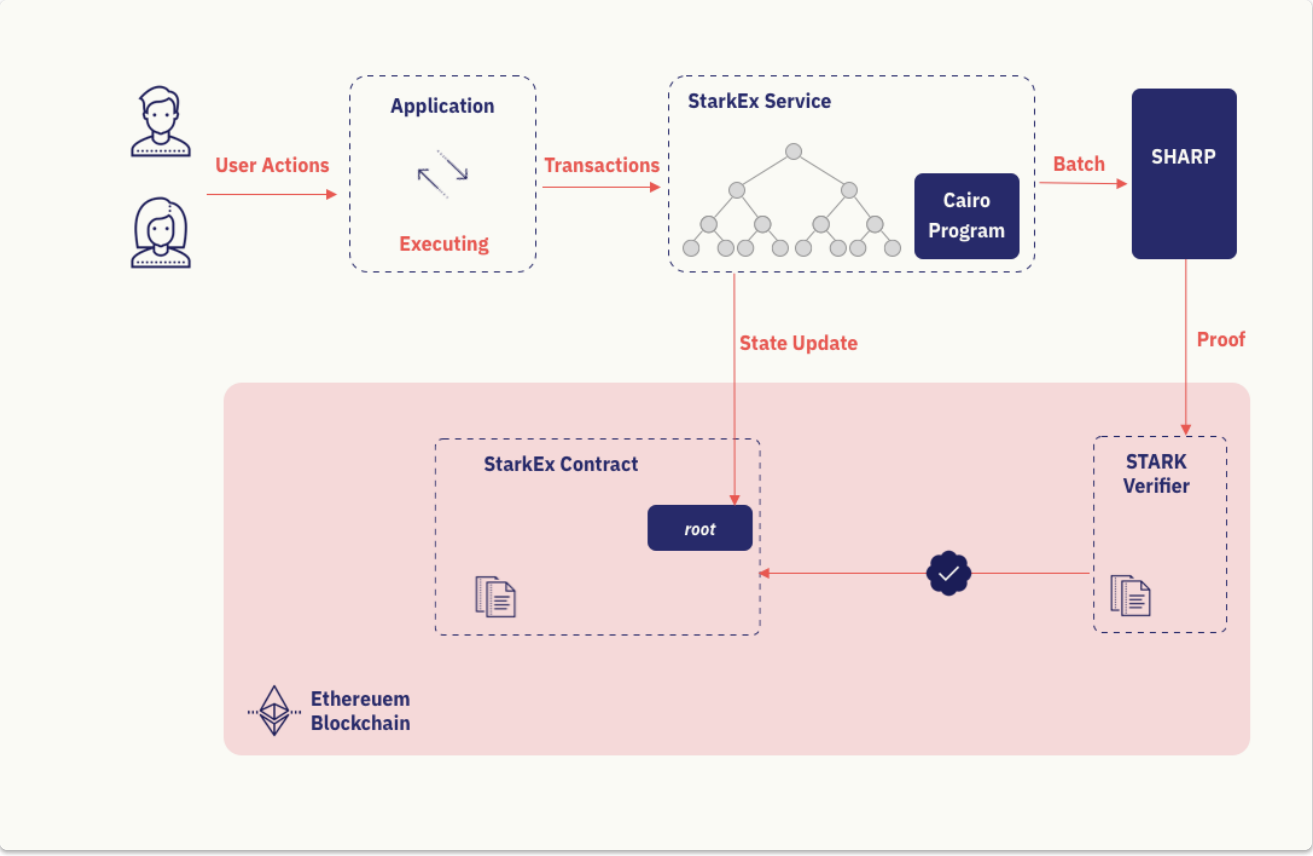
It has 270B cumulative trading and 65M transactions settled, with 1.25B total value locked.

StarkEx currently supports ETH, synthetic assets, and the following tokens:

- ERC-20
- ERC-721
- ERC-1155

StarkEx can also support tokens on other EVM-compatible blockchains.

StarkEx is a mature platform that has been deployed on Ethereum Mainnet since June 2020. Before its Mainnet deployment, over 50M StarkEx transactions were settled on both public and private Ethereum testnets.



StarkEx is trading focussed whereas Starknet allows generic computation