

Flaex

Decentralized Margin Trading Exchange Powered by Flash Swap V2

Flaex Foundation
January 15, 2024

Abstract

Decentralized Finance (DeFi) has revolutionized the financial landscape, enabling anyone with an internet connection to engage in the financial markets without the need for intermediaries. Beyond the common financial products, DeFi has introduced unique instruments that have no equivalents in traditional finance. One of the most renowned is the Flash Swap.

To seasoned DeFi traders, the term Flash Swap often brings to mind some of the most notorious hacks, resulting in losses of hundreds of millions of dollars that are often irretrievable. In this bold exploration, we aim to redefine Flash Swap and harness its distinctive capabilities to introduce Flaex—a pioneering decentralized margin trading exchange. By leveraging innovative lending protocols, we also aim to reduce the funding rate, making margin trading more accessible and cost-effective for traders.

Table of Contents

Abstract	1
Table of Contents	2
1 Introduction	3
2 Existing Works	4
3 Protocols	5
3.1 Architectural Implementation	5
3.2 Margin Trading Module	6
3.2.1 Description	6
3.2.1.1 What is a Flash Swap?	7
3.2.1.2 General Idea	7
3.2.1.3 Flaex's role	9
3.2.2 Use Cases	9
3.2.3 Liquidation	9
3.3 Fees	10
3.3.1 Commission Fees	10
3.3.2 Funding Rate	11
3.4 Capital Provider Module	11
3.4.1 Description	11
3.4.2 Use Cases	12
3.4.3 Profit Sharing Architecture	12
4 Summary	12

1 Introduction

With the rise of decentralized finance (DeFi), anyone with an internet connection and a crypto wallet like MetaMask or Trust Wallet can now participate fully in the decentralized financial world without needing to trust intermediaries. Thanks to numerous crypto exchanges, digital assets can be freely traded against each other at market prices. Traders can take long positions to speculate on the price increase of preferred assets. However, effectively speculating on price declines, or taking short positions, has been more challenging.

Flaex offers an innovative solution for traders to speculate on both the rise and fall of crypto asset prices. It also provides significant leverage, enabling confident traders to maximize their potential rewards. The protocol is entirely transparent and permissionless, ensuring users have complete control over their positions at all times.

On a larger scale, the derivatives market in the traditional financial infrastructure is enormous, estimated at over \$1.2 quadrillion—more than ten times the total world GDP. With the undeniable advantages of blockchain technology, more assets, including real-world ones, are poised to become tradable in the DeFi space.

2 Existing Works

Most users are familiar with centralized exchanges when it comes to trading crypto assets. Although equipped with an ease of uses and friendly interface, centralized exchanges are subject to users' fund manipulation. This fact materializes as recent shocking incidents take place in the crypto world, exposing harsh truths that the user's fund is 100% in the hand of its custodial party.

A number of decentralized exchanges have been introduced in the past couple of years and they have successfully removed the mentioned risk. However, some drawbacks were also put forward.

In order for a margin trading exchange to efficiently operate, a certain number of mechanisms has to be implemented. These mechanisms will be responsible for deciding the price at which two (or more) assets are traded against each other, it also has to allow users to borrow funds that will be used to leverage their position as well as maintain an efficient on-time liquidation process to ensure the protocol's solvency.

When it comes to borrowing funds for position leveraging, cost-wise, there are 2 issues that need to be solved. On traders' side, these funds need to be cheap and easily accessible. On liquidity providers' side, a sufficient rate of rewards needs to be ensured.

Existing protocols strive to maintain both trading and lending sections on their own, although some are significantly successful, it is clear to notice that bootstrapping enough liquidity on a new chain, or even on current chains, is extremely challenging. Any drops in liquidity provider's rewards that results in a less-than-accepted yield might lead to massive withdrawals and leave the protocol in great danger of insolvency.

With this in mind, Flaex sees that trying to maintain everything on its own is a tremendously challenging task that pays proportionally less rewards. Instead, Flaex chose to partner with already successful and market-risk-tested counterparties to fuel its operation. By combining the rich and deep liquidity of traditional DEXes like Uniswap and the livid money market of lending protocols such as AAVE, Flaex is capable of providing seamless margin trading experience to its users at an extremely low fee and low cost (which can go as low as 0.00009%/hour, or less than 0.8%/year).

3 Protocols

3.1 Architectural Implementation

There are 5 main contracts that are used to facilitate Flaex's operation, in which 2 contracts will serve as users' main interaction point.

- **Margin Contract:**

Includes Isolated Margin and Cross Margin Contract.

Contain basic functions such as:

- Deposit, Withdraw Funds
- Open, Close Long/Short Positions
- Liquidation Call

- **Vault Contract:**

Vault contains all assets, including yield-bearing assets and debt assets that are generated by Margin Contracts. This architectural choice eliminates the needs of Margin Contract to both act as an interaction point and asset storage at the same time. Instead, every time a user interacts with Margin Contracts, only internal transfers of funds need to be executed.

Since Vault's most critical functions (such as withdrawals of assets) are only callable by Margin Contracts, it is much more difficult for an attacker to exploit some coding errors and directly interact with Vault to drain assets.

On the other hand, Margin Contracts are set free from its storage role and can dedicate its resources for user interaction only.

- **Capital Provider Contract:**

Because AAVE limits its maximum loan-to-value, Margin Contracts alone cannot support users to enter a larger-than-4X leveraged position. By allowing other users to provide extra collateral, Flaex effectively decreases its loan-to-value and thus can support users to enter a much higher leverage position (which can go up to as high as 20X).

When a user decides to invest his asset to facilitate Flaex's operation, he will be eligible to 2 sources of income:

- A default interest rate that comes from AAVE.
- A share of the protocol's sources of revenue, generated from other users' positions under the form of trading commission fee.

Flaex also puts a Supply Cap on maximum deposits to the Capital Provider. This secures the total yield accrued to its providers since the larger the Capital Provider Pool is, the less yield each unit of capital will receive in return.

Later on, the token that is minted to Capital Providers can be used to create a separate Liquidity Pool on other DEXes where its prices will correlate to its representing asset plus the future rewards discounted to Present Value. When these tokens' quality reaches maturity, it can pave the way for more sophisticated derivative use-cases in other protocols.

Capital Provider Contract will keep track of each user's balance and rewards with the help of flToken Contract.

- **flToken:**

flToken has 2 basic functions that inherit standard ERC20 tokens that are:

- mint
- burn

Whenever users supply or withdraw a certain amount of asset, flToken will be minted or burnt accordingly. It is worth notice that the amount minted/burnt is not exactly the same as the amount of token supplied/withdrawn. Inside the Capital Provider Contract, a set of calculations is carried out in order to return a precise number. The math is inferred from the interest rate provided by AAVE.

flToken also acts as a base to calculate each user's eligible yield.

- **Signature Executor:**

Leveraging signature-based-execution, Flaex offers a gas-less transaction model that removes the needs of users having to prepare "ETH" as gas-fees in their Wallets.

With Signatures, Limit Orders such as Take Profit, Stop Loss can be achievable; closing the gap between Centralized Exchanges and Decentralized Exchanges in terms of ease of use.

3.2 Margin Trading Module

3.2.1 Description

In a margin trade, a trader borrows an asset and sells it immediately on the market for another asset, which is supposedly the asset that said trader would like to trade against.

It is crucial to understand that the definition of Long/Short is merely a simplified interpretation for end users. Let's take a look at below example:

Supposed a user would like to open a Long position on the trading pair of:

ETH/USDC

In this case:

- ETH is called a base token.
- USDC is called a quote token, which basically describes how much "USDC" it takes to be equal to 1 "ETH".

Longing with margin on ETH/USDC simply means that a trader is borrowing more quote token (USDC) than he has to buy a certain amount of base token (ETH). If the price of ETH rises against USDC, he would be able to sell all his ETH for a larger than previous amount of USDC and repays all his debt. The remaining USDC would be his profit. In the event that ETH's value drops relatively to USDC, a trader would suffer a loss.

Now consider the case that a user would like to go Short on the same trading pair, ETH/USDC.

He would then need to borrow a larger amount of base token (ETH) than he has and trade it for quote token (USDC). If the price of ETH drops relatively to USDC, he would only have to spend a smaller amount of USDC in order to buy back the amount of the ETH owned previously and thus effectively pockets a difference as profit.

It is easy to notice that going for a Short position of ETH/USDC simply means going Long on the “opposite” pair, which is USDC/ETH.

If the logic for going Long is applied, one will clearly understand the mechanism behind and the quote “the definition of Long/Short is merely a simplified interpretation for end users” is justified.

Moving forward in this paper, the term “Long/Short” will no longer be used and instead, the term “base token” and “quote token” will imply the direction of the trade, along with “open order” and “close order”.

3.2.1.1 What is a Flash Swap?

Flash Swap is an integral function of Uniswap V2 and V3. Since most current DEXes on the Ethereum blockchain as well as many other EVM-based-blockchains are forked from Uniswap, they all inherit the same function.

It is quite difficult to have an analogy of Flash Swap in real world examples. Instead, let's take a look at how an ordinary swap is carried out inside of Uniswap.

Suppose John wants to buy some ETH with his USDC, the technical term suggests that John is swapping his USDC for ETH.

John then proceeds to interact with the Uniswap Pool of ETH/USDC. This pool contains both assets (ETH and USDC) and the logic to decide the price of each asset relative to the other.

In an ordinary swap, the first thing John would do is to send his USDC to the Pool, after the Pool receives John's USDC, it will conduct its preset logic and calculate how much ETH is to be worth and then send out ETH to John.

However, in a Flash Swap, the Pool doesn't necessarily need to check if it has received any USDC at the beginning of the swap. Instead, it optimistically transfers out the requested ETH to John. At this point in time, John owns that ETH and can do whatever he wants with it. At the end of the transaction, the Pool will enforce that enough USDC is returned to its reserve.

One might wonder what if John doesn't pay back his USDC in a Flash Swap?

Since Ethereum transactions are atomic, the entire transaction can be rolled back to its initial state and John's ETH would actually never be transferred out.

It is also worth noting that everything must occur within a single block and John can decide to either return ETH or USDC to Uniswap Pool.

3.2.1.2 General Idea

Having grasped the basic concept of Margin Trading and Flash Swap, let's dive into how Flaex utilizes these features to power its own trading platform.

For margin trades, it is common that a trader has access to a pool of assets available for borrowing.

This is not the case for Flaex!

Roll back to the example in 3.2.1, supposed John would like to go for a long position on ETH/USDC.

Since John is going on long on ETH, which is the base token, John has to already own some ETH and needs to borrow some USDC in order to buy more ETH.

John can go to any existing Lending Protocols such as AAVE, Compound... and deposit his ETH as collateral, he then is eligible to borrow any other allowed assets against his collateral. In this case, he can borrow some USDC, which is the quote token, to buy more ETH.

However, Lending Protocols limit his borrowing power due to their “over-collateralized” model, which means he cannot borrow more than what he has put in as collateral. In fact, he can only borrow at a maximum cap of around 80-85% depending on which kind of assets being supplied.

Let's say John puts in 1 ETH at a value of 2000 USD per ETH, he decides to go for an 80% maximum cap of borrowable, which is equal to 1600 USDC and buys another 0.8 ETH.

At this point, John's position would be:

- Collateral: 1 ETH
- Borrow: 1600 USDC
- Available asset: 0.8 ETH

This would mean that John has entered a Long position in ETH/USDC at 0.8X Leverage.

What John can do now is re-supply his 0.8 ETH to the Lending Protocol to “rinse and repeat”, effectively keeping increasing his leverage.

However, one can clearly see that this approach poses a great deal of risks and requires many repetitive transactions. John can be instantly liquidated right after he hits his first borrow at 80% as the interest is accrued to his debt.

This is where Flaex comes into play and provides an extremely clever solution.

In order to increase leverage, the most crucial task is to be able to keep on borrowing, buying assets and re-supplying those assets back as collateral.

After the first borrow, John is left with 0.8 ETH which he would definitely continue to re-supply into the Lending Protocol as collateral. What if John has access to this 0.8 ETH even before he has to supply the first 1 ETH? If John can achieve this, he can actually supply 1.8 ETH and thus has effectively increased his borrowable amount.

It turns out that this is entirely possible thanks to the power of Flash Swap. John can first Flash Swap 0.8 ETH, plus his initial 1 ETH, he can now supply 1.8 ETH into the Lending Protocol as collateral and proceed to borrow the same 1600 USDC as previously explained to repay the Flash Swap amount.

In this case, John only has to borrow a much less amount of USDC which is reflected in terms of loan-to-value because:

- Collateral: 1.8 ETH
- Borrow: 1600 USDC
- Loan to Value: $\{1600 / (2000 \text{ USDC per ETH})\} / 1.8 = 44.44\%$

John can easily increase his leverage by increasing the Flash Swap amount, as long as his loan-to-value doesn't exceed the maximum cap, he will not be liquidated.

At 80% maximum cap, John can effectively go as high as 4X!

3.2.1.3 Flaex's role

From the above example, one might wonder what the role of Flaex is supposed to be. John can carry out this entire maneuver on his own.

Firstly, it is worth noticing that a Flash Swap is only available via smart contract interactions and requires deep understanding of not only defi but also program development expertise.

Secondly, when an individual user attempts to carry out this entire transaction on his own, he is subject to maximum 4X leverage. At the same time, he would be liquidated if asset's price moves to the unfavorable direction much sooner than he expects. This is because, at any given point in time, if the loan-to-value reaches the maximum cap, which is only at about 80%, he would be instantly liquidated. This can be simplified by the below example:

A trader entered a long position of 2X in ETH/USDC, the entered price of 1 ETH is equal to 2000 USDC. The amount is 10 ETH.

His position would be:

- Collateral: 10 ETH
- Borrow: 10,000 USDC
- Loan to Value at entered point in time: 50%

If the price of ETH drops to a point where his loan-to-value increases to 80%, he would be liquidated. The implied price could be calculated to be at 1250 USDC per ETH.

This is rather unfavorable for traders because, commonly speaking, when a trader goes for a 2X leverage position, he wouldn't be liquidated if assets price won't drop by nearly half!

Flaex, with its robust and well-designed architectural implementation, can allow other users to act as "collateral" provider, effectively decreasing the whole protocol's loan-to-value and thus increasing trader's leverage level.

The suggested ideal leverage would be somewhere around 10X.

3.2.2 Use Cases

Margin trading in general is a method to multiply gains from traders' critical decisions. The rise or fall of asset price directly affects their profit/loss.

Margin trading can also be used for hedging another existent position.

As long as traders can well-manage their positions, their gains would be multiplied by many times.

Investors can decide to become "collateral" providers to earn real yield generated from both interest rate and sharable profit from other trader's commission fees.

3.2.3 Liquidation

Liquidation on Flaex happens quite similarly to liquidation on Lending Protocols such as AAVE, Compound... Liquidators send an amount of asset to repay parts of

the liquidated user's debt and as a liquidation incentive, liquidators receive a percentage of the liquidated user's collateral, apart from the liquidated amount.

Flaex as a whole is subject to its lending partner, which is AAVE, in terms of liquidation; however, its users should also rely on Uniswap price as a source of valid liquidation price. The solution is an oracle aggregator which aggregates prices from both AAVE's native oracle and Uniswap Oracle. Each party accounts for an equal percentage of 50% in the final liquidation price.

Flaex embraces the common definition of "Margin Ratio" as liquidation condition. The formula to calculating "Margin Ratio" is:

$$\text{MarginRatio} = \frac{\text{Value of Collateral}}{\text{Value of Borrow}}$$

Currently, the threshold for liquidation to happen is at Margin Ratio ≤ 1.1 .

At Margin Ratio = 1.25, users will receive a Margin Call. Upon receiving such notifications, users can decide to repay parts of their debt, or close their position to avoid liquidation should the movement of the price keep steering towards an unfavorable direction.

Using Uniswap Oracle is quite risky, especially on Layer 2 chains such as Optimism, Arbitrum... because the cost for manipulating prices is much less than on Layer 1. On the other hand, using AAVE's native Oracle is indeed safer, but subject to delays in price broadcasting and insensitivity to small price movements.

Flaex's architectural mechanism allows for a unified aggregation of both Oracles and only inherits the most critical traits of both while eliminating the risks of oracle manipulation to carry out malicious liquidations by attackers.

In order for a valid liquidation to happen, the condition below must hold true:

$$\text{AAVEMarginRatio} * 97\% \leq \text{UniswapMarginRatio} < \text{AAVEMarginRatio}$$

Where:

- UniswapMarginRatio: The Margin Ratio of the highest Uniswap liquidity pool containing the 2 assets.
- AAVEMarginRatio: AAVE Margin Ratio

This allows for a more precise source of liquidation price to step into play. It also removes the risk of Uniswap Oracle manipulation because it requires Uniswap Margin Ratio to be less than AAVE Margin Ratio, but no less than AAVE Margin Ratio * 97%.

3.3 Fees

3.3.1 Commission Fees

The standard trading commission fee is currently at 0.05%.

The trading fee sharable for the Protocol is currently at 60%.

The liquidation incentive is currently at 2%.

The liquidation incentive sharable for the Protocol is currently at 50%.

All fees are transferred to Vault and is re-distributed to Capital Providers later.

3.3.2 Funding Rate

Funding Rate is derived directly from Flaex's lending protocol partners. Due to their market-proven efficient model, funding rate (or more precisely referred to as borrow rate) is extremely low on carrying an open interest on Flaex. This is most significantly reflected on large positions that are opened for a rather longer period of time.

The funding rate on Flaex depends on the interest rate (or APY) of base token and quote token. The formula is as follow:

$$fundingRateAPY = baseLendingAPY - \frac{marginLevel}{1+marginLevel} * quoteBorrowingAPY$$

Supposed users opened a position on the pair of ETH/USDC with marginLevel of 200%, where:

- ETH Lending APY is: 0.55%
- USDC Borrowing APY is: 1.71%

The fundingRateAPY would be: 0.59%

This converts to roughly: ~0.000067%/hour

Which is quite insane compared to other existing trading platforms!

It is also worth notice that the funding rate is implied within the position of users and is directly cleared when closing a position.

3.4 Capital Provider Module

3.4.1 Description

The Capital Provider Contract plays a vital role in facilitating Flaex's operation as well as ensuring the protocol's solvency. One can think of the Capital Provider Contract as a kind of a Pool Contract in other protocols such as Uniswap, GMX, Open Leverage, dYdX... where the Pool provides sufficient liquidity for traders to borrow funds against their collateral. At the same time, it enables its liquidity providers to earn real yield generated from the protocol's revenue. As the crypto market evolves, this model of real yield sharing is becoming more and more preferable to retail investors as it creates true and measurable values to its token/stakeholders.

One unique trait of Flaex's Capital Provider Module lies in the previously described Flash Swap mechanism. Since traders alone have already been able to fuel their position up to 4X leverage, they only require a relatively smaller amount of funds inside the Vault to fuel their larger leverage orders. This enables Capital Providers to capture much more handsome rewards on their investment and thus creates extremely efficient capital usage. Flaex also applies a supply cap on the total amount of investment eligible, meaning two things:

- Only early Capital Providers are able to join the protocol's Capital Provider Module to earn real yield.
- Existed Capital Providers are guaranteed of their yield returns based on the protocol's current business revenue performance.

Without the supply cap, as the protocol grows in public reputation, more and more investors will be able to join freely in order to earn yields while its revenue cannot keep up with the growth of capital supplied, leading to a significantly less yield generated per unit of capital.

Some estimations could be made as below:

For most other protocols, the pool must be responsible for the total of their amount of Open Interest, let us presume this type of model yields a 100% efficiency in capital usage.

For Flaex, suppose all open interest amount is X , at average leverage of 4X, this renders the whole protocol's margin ratio at 1.25. The total amount of capital eligible for supply that is capped at margin ratio ≤ 2 is:

$$totalSupply \leq 0.6 * X$$

Compared to other protocols where every unit of open interest amount is fueled by 100% of the liquidity available inside the Pool, Flaex only needs 0.6. Which means at its worst state where the supply cap is reached, the capital efficiency is at least **66.67%** more efficient.

This is all thanks to the novel implementation of the Flash Swap function!

3.4.2 Use Cases

Capital Providers can diversify their portfolio and expect a high accuracy for rate of return.

Smart contract architectural designs ensure the safety of users' funds.

Compared to other options such as supplying directly to Lending Protocols, Capital Providers of Flaex earns an extra source of yield generated from trading commission fees on top of the already accrued interest.

3.4.3 Profit Sharing Architecture

The profit sharing model is quite straight-forward.

Apart from the default interest accrued from Flaex's lending protocol partners, Capital Providers are eligible to another source of income, which is the trading fees generated from other users' positions.

Inside the Capital Provider Module, a global index is kept track of under the name of flIndex. This index is responsible for highly accurate calculation of each user's eligible yield and embraces the "ever-increasing" model that resembles industry-standard lending protocol architecture.

4 Summary

- **Flaex**
 - o A complete defi suite platform.
 - o Open-sources, free to use.
 - o Upgradeable smart contracts.
- **Flaex Margin Trading Module**
 - o Peer-to-Peer decentralized margin trading protocol.
 - o Margin leverage supported up to 20X.
 - o Can be used to speculate on assets' prices to earn multiplied profits.
 - o Can be used to hedge other open positions.
 - o Extremely low funding rate.
 - o Competitive trading commission fee.
- **Flaex Capital Provider Module**
 - o Profit sharing, real yield distributors.
 - o Highly efficient in terms of capital usage.
 - o Double sources of income for Capital Providers.
 - o Creates true and measurable values for token/stakeholders.