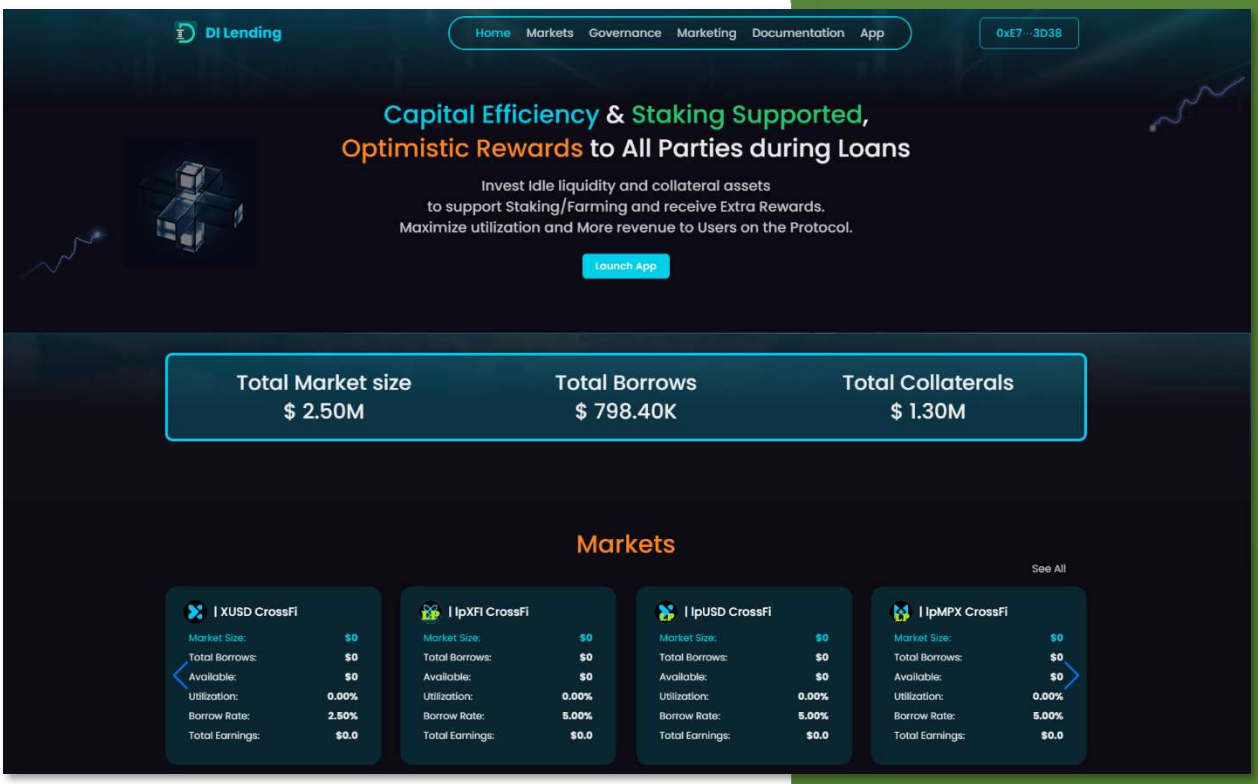
Marketing Documentation for DI Lending



Denys Ivanenko

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DI Lending Protocol

1. Overview

Product Name: DI Lending

Vision: Maximize and Optimize capital efficiency and revenue to all parties of Lending.

Date: 2024.9.16

2. Problem Statement

Introduction to DeFi Lending

Decentralized Finance (DeFi) lending revolutionizes traditional financial systems by leveraging blockchain technology to enable peer-to-peer lending and borrowing without intermediaries. Unlike traditional models, where banks act as gatekeepers and extensive personal information or credit assessments are required, DeFi operates within a trustless system. In this environment, users maintain full control over their assets, providing flexibility, transparency, and efficiency.

How DeFi Lending Works

In DeFi lending platforms, borrowers can secure loans by providing collateral, typically in the form of cryptocurrencies. This over-collateralization ensures that lenders are protected from default risks, as the collateral is held in a smart contract until the loan is repaid or liquidated in case of default. On the other hand, lenders earn interest on their deposits, with interest rates fluctuating based on the supply and demand dynamics of the platform.

Utilization Ratio: A Key Indicator

The utilization ratio is a critical measure of the health and performance of a lending protocol. It reflects the percentage of assets in a lending pool that are actively being borrowed.

- **High Utilization** suggests strong demand for loans, which drives up interest rates for borrowers and offers higher returns for lenders.
- **Low Utilization** indicates excess liquidity, leading to reduced interest rates and lower efficiency for the capital deployed.

In current lending protocols like Aave and Compound, the utilization ratio often falls below the optimal threshold, creating inefficiencies in capital usage. For instance:

- **Aave** shows utilization ratios of 78.22% (USDT) and 83.9% (USDC), below the optimal rate of 92%.
- **Compound** reports utilization ratios of 68.61% (USDT) and 74.35% (USDC), against an optimal target of 90%.

Contradictory between revenue of lenders and interest of borrowers

Borrowers need low utilization to borrow at low interest rates, while lenders want high utilization to avoid dilution of income. This is a major problem for loan pools and contradict between lenders and borrowers, leading to capital inefficiencies.

Capital Inefficiency in DeFi Lending

The low utilization of lending pools results in significant capital inefficiency. The collateral provided by borrowers, which is often over-collateralized, remains locked and unproductive. This means a substantial amount of capital sits idle, failing to generate any return for either the borrowers or the platform. Current lending protocols miss opportunities to put these locked assets to work, resulting in missed revenue opportunities.

Comparison to Traditional Lending

In Traditional Lending, collateral assets (Real Estate, Gold, or etc) should not be used and processed but secured by lender organization because those can be unique and lost, damaged, or modified.

However in DeFi, collateral assets can be used if those can be redeemed instantly (in time) and traded securely in external of the protocol.

What is actual utilization, and does current utilization reflect capital utilization?

TVL(Total Values Locked in protocol) reflects total capitals invested in the market and it consists of principal (liquidity) and collateral assets.

In current Lending, utilization related to principal assets of the pool, and this value is less than half of TVL.

```
TVL = TotalPrincipal + TotalCollateral
ActualUtilizationRatio = UtilizedPrincipal / TVL
UtilizedPrincipal = UtiliztionRatio * TotalPrincipal
TotalCollateral >= CollateralizationRatio * UtilizedPrincipal
                 = UtilizationRatio * CollateralRatio * TotalPrincipal

TVL >= TotalPrincipal * (1 + UtilizationRatio * CollateralizationRatio)
ActualUtilizationRatio = UtilizedPrincipal / TVL <= UtilizaitonRatio / (1 +
UtilizationRatio * CollateralizationRatio)

// when collateral ratio is 1.2 and utilization ratio is 0.8
TVL >= TotalPrincipal * (1 + 1.2 * 0.8) = TotalPrincipal * 1.96
ActualUtilizationRatio <= 0.8 / 1.96 = ~0.408 (40.8 %)

// when utilization rate is 0.9 (optimal rate)
TVL >= TotalPrincipal * 2.08
ActualUtilizationRatio <= 0.9 / 2.08 = ~0.432 (43.2%)
```

In the above explanation, 1.2 refers to the collateralization ratio, that is, the amount of collateral required to borrow 1 unit of value. We can see the graph that shows relation between total capital utilization (actual utilization) and pool's utilization.

In practice, borrowers lock up more collateral than the collateralization ratio to better secure their assets. When utilization is 80%, value of total collaterals is 96% of principal and it is nearly about 50% of TVL.

Utilization of total = Utilization of principal * Principal Rate to TVL < Utilization of Principal * 0.45

We can see that the actual capital utilization is at most 45% even when optimal rate is reached. If the utilization of lending is 80% in current lending protocols, it means that only 40% of the total capital are actually utilized.

3. Solution Overview

Introduction to DI Lending Protocol:

"DI Lending" Protocol is the one to put the idle liquidity (principal) and collateral assets into other staking/yield farming protocols to maximize capital utilization and revenue in the pool.

This protocol addresses capital inefficiency by maximizing the use of idle assets in the pool. The core innovation lies in the strategic allocation of unutilized borrowing and collateral assets into other secure revenue protocols.

Key Features

- **Dynamic Capital Allocation**: Idle liquidity from both borrowing and collateral reserves is invested in staking pools to generate additional returns for all participants, enhancing the capital efficiency of the platform.

- **Revenue Generation for Borrowers**: Borrowers also benefit, as their collateral is no longer sitting idle but is actively generating income through staking. This not only covers some of the interest costs of their loans but also provides them with a new revenue stream.
- **Enhanced Returns for Lenders**: Lenders gain higher returns as the excess liquidity is utilized, increasing the overall yield on their deposits.
- **Balanced Risk Management**: The allocation of assets into staking pools is managed dynamically based on real-time data of supply, demand, and utilization ratios, ensuring that the protocol always maintains sufficient liquidity for borrowers while maximizing earnings from staking/yield farming protocols.

Benefits of DILending

- **Capital Efficiency**: Idle liquidity is dynamically allocated to staking pools, maximizing the utilization of the platform's capital and providing consistent returns.
- **Staking-Enhanced Income**: Lenders and borrowers alike benefit from staking rewards, creating a more balanced and fair distribution of income in the system.
- **Sustainable Growth**: By ensuring higher utilization rates and increasing returns for all parties, the protocol fosters a healthy, growing ecosystem.

4. Technology and Architecture

- Main logic of **DI Lending** Pool which follows by Aave/Compound variable lending architecture.

  The pool automatically updates the interest rate based on utilization each time a lender supplies a principal asset or a borrower borrows a principal asset and applies it to the next loan

UR = TB / TS
BR = b0 + UR * s1 / OR
LR = BR * UR * (1 – reserve)
Elapsed = currentTime – lastUpdated
creditIndex = creditIndex * (1 + LR * Elapsed/ year)
debtIndex = debtIndex * (1 + BR * Elapsed/ year)
UR: Utilization Rate, **TB**: Total Borrowed, **TS**: Total Supplied
BR: Borrow Rate, **b0**: Base Rate, **s1**: Slope1, **OR**: optimal Ratio
LR: Liquidity Rate, reserve: reserve ratio for protocol
creditIndex and borrowIndex shows APR for lenders and borrowers.

- Key Logic is **Investment Logic** which invests idle principal and collaterals and redeem those assets when needed.

  This Logic play as two way valve role in the liquidity flows. That means assets stream are formed by dynamics of demand and supply. If demand dominates in the pool, assets stream flows to the protocol to return higher interest rates, and if supply dominates in the pool, stream flows to the external protocol.

  Protocol calculates idle assets in the pool (remaining collaterals and idle assets).

Protocol determines whether invest to external pools or redeemed based on current dynamics of demand and supply.

If idle principals or collaterals are increased by threshold, then pool start unlocking assets from the pool and transfer to external protocols to generate passive income.

At this moment, pool selects best candidate staking/yield farming/other lending protocols in the registry based on protocol's time-weighted accrued rate at that moment and transfers assets to external protocols.

If principal or collaterals needs to transfer to users, then pool unlock tokens from the external protocol with revenue, and then transfer tokens.

Pool selects protocols from lowest rate protocols for unlocking.

Example

xAPP (XFI app) provide features like "get" and "stake".

If lending pool has USDT as principal and XUSD as collateral, then we can invest idle principal USDT and collateral XUSD to get "lpUSD" and stake it to receive external rewards of WETH.

So this protocol can support xAPP and lpUSD, lpMPX, lpXFI staking by idle assets and collaterals.

- **Introduction to Keeper & Governance**

  - Buffer (Two-way valve capacity)

    Locking/Unlocking total idle assets (principal and collateral) from/to the external protocols requires more complicated and frequent transaction with those, so there should be a certain buffer rate which is not utilized to avoid frequent transactions.

The setting of Buffer rate will be determined by voting and governance module.

- Extra Revenue Distribution

  DI Lending aims to distribute fairly revenue to all parties on the protocols based on their contribution to the protocol.

  Revenue from lending will be distributed to the lenders and protocol, but revenue from Investment will be distributed to the all parties, because borrowers' collateral (120% of total borrows) participates into the investment.

  Collateral assets are all of borrowers, so their contribution is very high in investment action, revenue accrued to borrowers should be higher than lenders.

  Governance module determines **protocol fee rate, borrower rate** by voting.

  For ex, assume that protocol fee rates is 10%, and borrowers' rate is 70% and revenue from collateral investment is 1000 USDT.

  Protocol: 1000 USDT * 10% = 100USDT

  Borrower: (1000 – 100) * 80 % = 720 USDT

  Lender: (1000 – 100) * 20 % = 180 USDT

For more information, please see the technical documentation site.
https://dilending.gitbook.io/di-lending

5. Product Demo or Use Cases

https://dilending-portfolio-as.com

Current MVP version aims to show only possibility of extra revenue by idle liquidity and collaterals using mocked tokens and mocked external protocols.

Demo Website	https://dilending-portfolio-as.com
All Open Source	https://github.com/petro1912/DILending
Backend (Solidity, Foundry)	https://github.com/petro1912/DILendingXFI
Backend (Solidity, Hardhat)	https://github.com/petro1912/DILendingXFI-Hardhat
Frontend (Next.js + Mui)	https://github.com/petro1912/DILendingXFI-Frontend

Smart Contract Deployed on CrossFi Chain

Contract Name	Github Repo Deployed Address
LendingPoolFactory.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/LendingPoolFactory.sol 0x9B56b45e3C3ba5Aa5E1E0BD4aD4681FD1000B2CB
DIAOracleV2	https://github.com/petro1912/DILendingXFI/blob/master/src/oracle/DIAOracleV2Multiupdate.sol 0xEc960258F3e38E1E89dD2c01BB8988D91866CbC9
InvestmentModule.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/invest/InvestmentModule.sol 0xC99d00f8eFE62ecC0B1A588420F82BBeBf0d4340
libraries/ TransferLib.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/TransferLib.sol 0x2f74146E3a055be8852B7E89f55c5Ec22d198856
libraries/PriceLib.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/PriceLib.sol 0x8f25AB10478af5110D8c14f449d1B8647B68c735

libraries/InterestRateModel.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/InterestRateModel.sol 0xaa2a5562AC3A0272726899141CEE15c01Dfc7902
libraries/InvestmentLib.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/InvestmentLib.sol 0x9419954a16749c25568DFaF54Ac887717fea0A3A
libraries/ValveLib.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/ValveLib.sol 0xDFAa345dd1B354F1A0eBaaDbf939FAF38A04E050
libraries/InitializeAction.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/InitializeAction.sol 0x133c03f96ae8d3A5356280e4c42058Caf2A7abd0
libraries/AccountingLib.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/AccountingLib.sol 0xf9CB9C005a55D3D0ce6E77013f29E27C33F0f2c4
libraries/AccountingLib.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/AccountingLib.sol 0x0a78bE3aAd15F6618fc35C13591556A99E35aFF2
libraries/PositionInfo.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/PositionInfo.sol 0x163D2aeAa4529aF14e963F939651b4ee657bC3f2
libraries/Repay.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/Repay.sol 0xFF2B23a3C16036fdEBE50f7A38169fB6ba053733
libraries/Borrow.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/Borrow.sol 0x515c6ddc6B0Dc86Ca52002c3a6887ec8E69DB6D1
libraries/Supply.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/Supply.sol 0x9e15b43F6D9D600Cd7be0A35120bC0C3e6BE5d10
libraries/Liquidation.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/Liquidation.sol 0xC49d7E95caeAfBa1493A5bC6dAe056Fe7114eab5
libraries/PoolStatistics.sol	https://github.com/petro1912/DILendingXFI/blob/master/src/libraries/PoolStatistics.sol 0x5D5f9E4be6be6d5899ba8994ECe031D41d8439A2

6. Business Model

How the protocol generate revenue

- Lending Pool generates interest fee from borrowers based on variable interest rate by pool's utilization context.
- Investment Logic (invest idle liquidity and collaterals to other revenue protocols) generates revenue to the all parties on the protocol according to calculation indicated in technical section of this documentation.

  Lender: receives income by Borrower's interest + extra revenue from Investment (main income from idle liquidity + some income from collateral investment)

  Borrower: receives main part of revenue from Investment

  Protocol: receives fees from 2 Modules (Lending, Investment)

Business Model Canvas

<table>
<tr><td colspan="2" rowspan="2">Lean Canvas</td><td>Designed for:</td><td>Designed by:</td><td>Date:</td><td>Version:</td></tr>
<tr><td>DI Lending Protocol</td><td>Denys Ivanenko</td><td>2024.9.14</td><td>1.0</td></tr>
<tr><td>Problem</td><td>Solution</td><td>Unique Value Proposition</td><td>Unfair Advantage</td><td colspan="2">Customer Segments</td></tr>
<tr><td>• Contradictory between lenders and borrowers
• Unutilized idle liquidity
• Locked Collaterals</td><td rowspan="2">• Dynamic Capital Allocation
• Revenue Generation for Borrowers
• Enhanced Returns for Lenders</td><td rowspan="2">High revenue to all parties, especially revenue possibility to even borrower.</td><td rowspan="2">It may impact the revenue of other external protocols.</td><td colspan="2">Startup Founders

Advisors/Investors</td></tr>
<tr><td>Existing Alternatives</td><td>Key Metrics</td><td>High-Level Concept</td><td>Channels</td><td colspan="2">Early Adopters</td></tr>
<tr><td></td><td>• Extra revenue
• Utilization & Market Participation</td><td>Double Investment
Two-way Valve & Buffer</td><td>• Lenders - Supply, Withdraw liquidity
• Borrowers – Deposit, Withdraw Collateral, Borrow, Repay</td><td colspan="2"></td></tr>
<tr><td colspan="3">Cost Structure</td><td colspan="3">Revenue Structure</td></tr>
<tr><td colspan="3">• Variable Rate Lending
• Idle Investment
• Governance</td><td colspan="3">• Lenders: borrower interest, passive income from idle liquidity, some part of revenue from collateral investment.
• Borrowers: main part of revenue from collateral investment
• Protocol: protocol reserve fee of all revenue on the protocol(Lending, Investment)</td></tr>
</table>

7. Team and Advisors

Currently, in this MVP stage, this product is only proposed and developed by owner (Denys Ivanenko).

Denys Ivanenko: Full stack developer with 10+ years of experience in designing and implementing variety domains and scales of web2 and web3.

Backend	Node.js+Express.js, Python+Django, PHP
Frontend	React.js/Next.js, Vue.js/Nuxt.js, web3.js, ethers.js, wagmi
Blockchain	Solidity, Foundry, Hardhat,
Web3 Security Audit:	https://audits.sherlock.xyz/watson/petro1912 https://code4rena.com/@petro_1912

Further development, market analysis, research use cases, partnership should be resolved and team members will be required as following.

Business Developer : 1

Market researcher & Marketing Expert: 1 or 2

Web3 Content Writer: 1

CTO or Tech Lead: 1

Smart Contract Development: 1

Front End Development: 2

Note: The roadmap and future development schedule will be published later after team and business development is complete.