

Emerald Finance: A Comprehensive Protocol for Yield Optimization and Leveraged Staking

Abstract. Emerald Finance is a decentralized finance (DeFi) protocol that simplifies yield generation and staking strategies through automated vaults and seamless integrations with existing platforms. Built on the ERC-4626 standard, it ensures compatibility, composability, and efficient asset management via automation tools like Chainlink Keepers and Gelato Network.

A key feature is the Emerald Finance token (\$EMLD), a yield-bearing asset tied directly to protocol revenue and backed by a basket of real assets. With minting and burning mechanisms, it maintains intrinsic value, supports liquidity through ve(3,3) systems, and enables collateralization for expanded financial opportunities.

Emerald Finance emphasizes transparency, displaying net APY calculations on its user interface, giving users clear insights into potential earnings. This whitepaper outlines the protocol's architecture, strategies, and roadmap, showcasing how Emerald Finance delivers accessible, optimized yield solutions.

1. Introduction

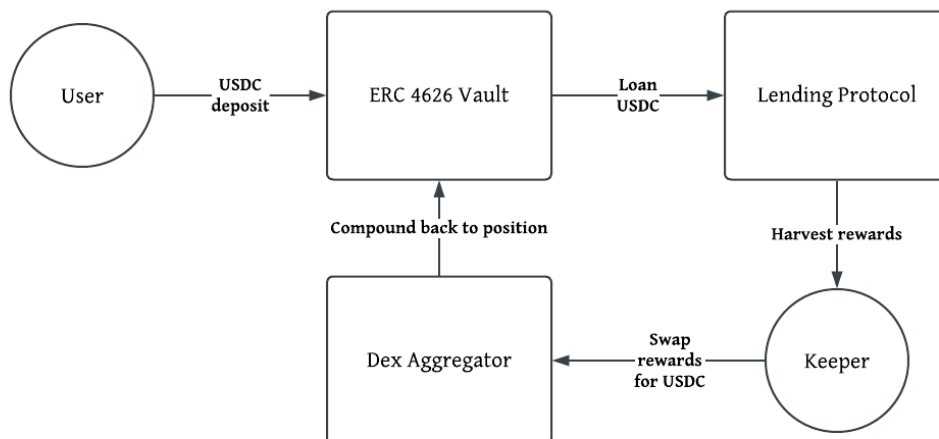
The DeFi space has rapidly evolved to include a variety of yield farming and staking opportunities, attracting users seeking high returns on their digital assets. However, the complexity of managing multiple protocols, monitoring positions, and manually compounding rewards has created barriers for many participants. Emerald Finance addresses these challenges by offering a protocol that automates these processes, enabling users to benefit from optimized strategies without the need for constant management.

Emerald Finance's core value lies in its ability to aggregate and optimize yields from multiple sources, including automated market makers (AMMs), lending protocols, and governance token ecosystems. Users interact with the protocol by depositing assets into team-crafted vaults, which are designed to implement specific yield strategies. These vaults leverage automation and real-time monitoring to ensure maximum efficiency and return on investment.

By prioritizing transparency, Emerald Finance ensures that users have a clear understanding of the potential earnings from their investments. The APY displayed in the UI already accounts for performance fees, providing a net figure that reflects actual returns. This approach aligns with the protocol's mission to create a trustworthy and accessible DeFi solution.

2. Vaults: The Foundation of Emerald Finance

Vaults serve as the core mechanism through which Emerald Finance executes its yield strategies. Each vault is tailored to specific assets and protocols, enabling users to participate in various yield-generating opportunities with minimal effort. The implementation of the ERC-4626 standard ensures that these vaults are modular, efficient, and compatible with other DeFi systems.



Lending Vaults

Lending vaults are designed to interact with DeFi lending protocols like Aave and Compound. Users deposit single assets into these vaults, which are then lent out to generate interest and earn governance token rewards. The protocol handles all aspects of the lending process, including harvesting rewards and reinvesting them into the user's position.

For instance, a user depositing USDC into a lending vault benefits from interest generated on the lending platform, as well as rewards in governance tokens like AAVE or COMP and incentives. These rewards are harvested regularly, converted back into USDC using a decentralized exchange (DEX) aggregator, and reinvested into the user's position. This continuous compounding mechanism increases the user's returns over time without requiring manual intervention.

Liquidity Provider Vaults

Liquidity provider vaults cater to users who provide liquidity to AMMs such as Uniswap and SushiSwap. By depositing LP tokens into these vaults, users enable the protocol to stake these tokens in liquidity pools, earning rewards in the form of native platform tokens. These rewards are then reinvested into the LP position to compound returns.

For example, a user providing liquidity for an ETH/USDC pool on Uniswap can deposit their LP tokens into an Emerald Finance vault. The protocol stakes these tokens, harvests the rewards earned, swaps them for more LP tokens, and redeposits them into the user's position. This automated process enhances the user's yield without the need for active management.

Governance Token Vaults

Governance token vaults focus on maximizing returns from governance protocols. Users deposit governance tokens, such as CRV or BAL, into these vaults, which then stake the tokens in their respective protocols to earn rewards like bribes, trading fees, and governance incentives. The rewards are automatically harvested and compounded into the user's governance token holdings.

For instance, a user depositing CRV tokens into a governance vault benefits from rewards generated within the Curve ecosystem. The protocol stakes the CRV tokens, collects bribes and trading fees, swaps them for additional CRV, and reinvests the tokens to grow the user's position over time.

Leveraged Staking Vaults

Leveraged staking vaults are designed for users who aim to maximize the efficiency and yield potential of their liquid staking tokens while minimizing risks. These vaults allow users to deposit tokens such as stETH as collateral on lending platforms, enabling them to borrow ETH without selling their stETH holdings. This strategy not only unlocks liquidity but also creates opportunities for compounding and greater capital efficiency.

When stETH is deposited as collateral, users continue to earn staking rewards from the Ethereum network. Borrowed ETH can then be reinvested to purchase additional stETH, which is redeposited as collateral, creating a recursive compounding loop that significantly amplifies the yield from the user's initial position. Over time, this approach allows users to achieve higher returns without requiring additional upfront capital.

Using stETH as collateral to borrow ETH also reduces liquidation risks, making it an attractive strategy for users. Since stETH is a liquid staking derivative of ETH, the value of these assets is closely correlated, meaning that price fluctuations are less likely to create significant disparities that could trigger liquidation. Additionally, stETH is yield-bearing, continuously generating staking rewards, which effectively increases the value of the collateral over time. This ongoing appreciation further lowers the risk of liquidation by strengthening the collateral position.

The ability to borrow ETH while maintaining staking rewards provides users with liquidity that can be reinvested or deployed in other DeFi opportunities. By leveraging stETH's dual role as yield-bearing collateral and a borrowing base, users can maximize the productive use of their capital. The protocol automates this entire process, managing collateral, staking rewards,

borrowing, and reinvestments, so users can benefit from enhanced returns without manual intervention. With its combination of staking rewards, reduced liquidation risks, and capital efficiency, leveraged staking vaults provide a secure and efficient way to optimize DeFi yields.

2. Automation and Optimization

Emerald Finance relies heavily on automation to optimize yield generation and simplify the user experience. By automating key processes such as reward harvesting, token swapping, and reinvestment, the protocol ensures that users consistently achieve competitive returns without requiring active participation.

Automation Tools

The protocol employs multiple automation services to streamline operations and minimize the risk of downtime. Chainlink Keepers and Gelato Network serve overlapping purposes, such as executing tasks like harvesting rewards and rebalancing vaults. By utilizing both services alongside an internal backend system, Emerald Finance ensures redundancy and reliability, reducing the likelihood of service interruptions.

The internal backend system further enhances efficiency by continuously monitoring the performance of vaults and triggering adjustments based on predefined parameters. This multi-layered approach ensures that critical processes—such as reward harvesting, token swapping, and rebalancing—are executed seamlessly, providing users with consistent returns and optimized yield strategies. By combining external automation tools with in-house monitoring, Emerald Finance prioritizes operational stability and efficiency.

Yield Optimization

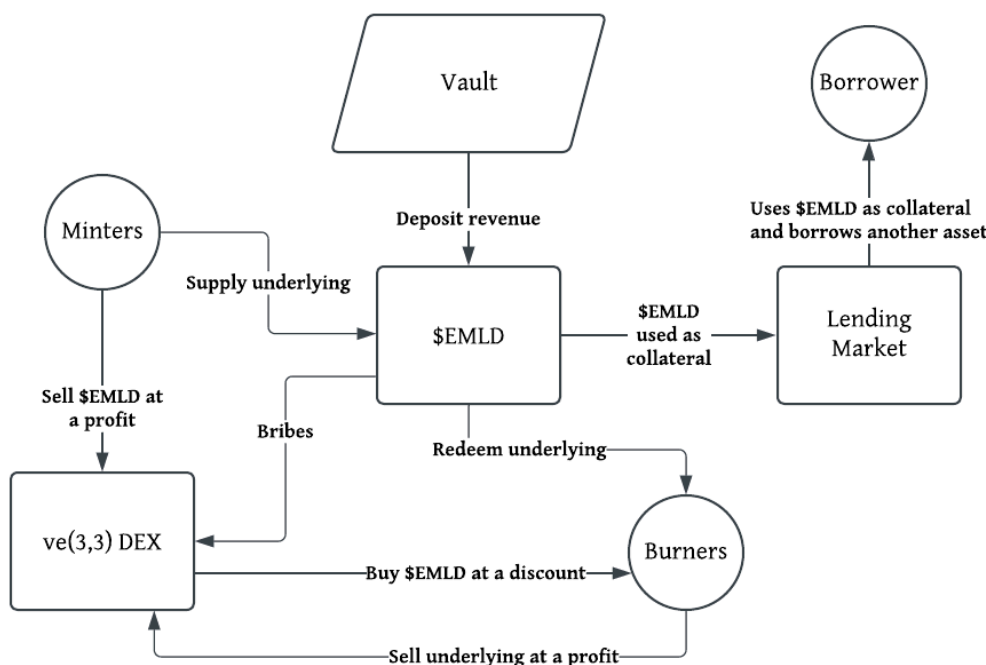
Yield optimization involves harvesting rewards from external protocols, swapping them for the base asset of the vault, and reinvesting them into user positions. This process occurs multiple times daily, depending on market conditions and protocol incentives. By automating this cycle, Emerald Finance maximizes the compounding effect, increasing the overall annual percentage yield (APY) for users.

Transparent APY and Fee Structure

Transparency is a core principle of Emerald Finance. The protocol ensures that the APY displayed on the UI reflects the actual net returns after deducting performance fees. This net APY provides users with an accurate understanding of their potential earnings, eliminating confusion and aligning expectations with actual outcomes.

The fee structure is designed to prioritize user profitability. Performance fees are applied only to realized profits, ensuring that users retain the majority of their returns. There are no management fees, and all costs are clearly communicated through the UI.

3. Token Design and Rationale



The Emerald Finance token (\$EMLD) is designed as a value-driven, yield-bearing asset tied directly to the protocol's revenue and underlying fund. Unlike traditional protocol tokens, it focuses on intrinsic value, utility, and financial sustainability. Below is an overview of its key features and the rationale behind them:

Revenue-Backed Yield-Bearing Asset

The Emerald Finance token represents a proportional share of a fund composed of revenue-generating assets. The fund grows over time as a portion of protocol fees from vaults is allocated to it, increasing the backing for each token. This mechanism transforms the token into a yield-bearing instrument where holders benefit directly from the protocol's growth and success. By linking token value to tangible, protocol-generated revenue, it creates a strong foundation for sustainable demand and long-term value.

Minting and Redemption Mechanism

The token maintains its intrinsic value through a clear minting and burning mechanism:

1. **Minting:** Users can mint \$EMLD by supplying the underlying assets in proportion to the fund's composition. This ensures that new tokens are fully collateralized, protecting the value of existing holders and maintaining the integrity of the fund.
2. **Burning:** Token holders can burn their tokens to redeem their proportional share of the fund's underlying assets. This redemption feature creates a direct link between the token's market price and the value of the assets it represents, establishing a tangible floor price and minimizing speculative volatility.

Together, these mechanisms ensure that the token is always tied to the value of the fund, enhancing transparency and stability.

Intrinsic Growth and Long-Term Incentives

The underlying assets per token increase over time as the protocol's revenue is continuously added to the fund. This compounding effect incentivizes long-term holding, as tokenholders benefit from the gradual appreciation of the token's intrinsic value. By aligning rewards with patience, the design discourages speculative behavior and creates a steady demand for the token.

Liquidity and Flywheel Mechanism

Emerald Finance will create a gauge on a ve(3,3) exchange, leveraging part of its revenue to incentivize liquidity for the \$EMLD pool through bribes. These bribes incentivize ve-token holders to vote for emissions favoring the token's liquidity pool. This approach initiates a **flywheel effect**:

- Bribes attract votes, directing more emissions to the token's pool.
- Higher emissions encourage liquidity providers to deposit assets into the pool.
- Increased liquidity improves the token's accessibility, reduces slippage, and attracts more users.
- As the protocol grows, revenue increases, enabling larger bribes and perpetuating the cycle.

This self-reinforcing mechanism ensures sustainable liquidity and market depth for the token, while further integrating it into the broader DeFi ecosystem.

A Reliable Collateral Option

Given its yield-bearing nature and backing by real assets, the Emerald Finance token is well-suited as collateral in lending markets. Holders can borrow against their tokens without selling them, unlocking additional capital while continuing to earn yield. This utility expands the token's use cases and appeal to both individual and institutional participants, enhancing its adoption and liquidity.

Arbitrage Opportunities and Market Efficiency

The Emerald Finance token design inherently creates arbitrage opportunities, promoting price stability and market efficiency. These opportunities arise from the token's minting and burning mechanisms, which link its market price to the value of the underlying assets.

How Arbitrage Works

- **Price Above Intrinsic Value:** Users can mint tokens by supplying underlying assets and sell them at a higher market price, increasing token supply and driving the price down.
- **Price Below Intrinsic Value:** Users can buy tokens at a discount, burn them, and redeem the underlying assets, reducing token supply and driving the price up.

Benefits

- **Price Stability:** Arbitrage aligns the token's market price with its intrinsic value.
- **Liquidity Growth:** Arbitrage activity increases trading volume and liquidity in the token's pool.
- **Revenue Generation:** Trading fees from arbitrage contribute to the protocol's revenue and the token's backing.

By encouraging arbitrage, the Emerald Finance token fosters efficient markets, enhances liquidity, and supports the overall health of the ecosystem.

User Experience and Transparency

Emerald Finance is designed with user accessibility and transparency at its core. The protocol's user interface provides a straightforward experience, enabling users to deposit assets, monitor positions, and track performance without requiring technical expertise. Real-time performance metrics are displayed, including detailed APY breakdowns that help users make informed decisions about their investments.

The inclusion of net APY on the UI is a standout feature of Emerald Finance. By displaying returns after accounting for performance fees, the protocol ensures that users have a clear understanding of their actual earnings. This approach eliminates confusion and fosters trust, particularly among users new to DeFi.

Emerald Finance also prioritizes user education, offering comprehensive onboarding resources to assist users in understanding vault mechanics, automation processes, and yield strategies. These resources are tailored to meet the needs of both novice and experienced DeFi participants, ensuring that the platform remains accessible to a wide audience.

4. Roadmap

Emerald Finance's roadmap reflects its commitment to delivering a streamlined and effective DeFi experience while fostering community growth and scalability. The outlined milestones aim to establish a strong foundation, expand protocol offerings, and integrate with the broader DeFi ecosystem.

Phase 1: Community Building

The initial focus is on building a robust and engaged community of early adopters and supporters. This phase includes campaigns designed to introduce users to the protocol and its features, laying the groundwork for long-term growth.

- **Airdrop Campaign via Zealy:** Launch a Zealy-based campaign to incentivize participation and spread awareness about Emerald Finance.
- **Airdrop to Users:** Distribute tokens to eligible users, rewarding early engagement and onboarding them into the ecosystem.

Phase 2: Protocol Launch

This phase centers on rolling out the core components of the protocol, including its token and initial vaults.

- **Launch Initial Vaults:** Introduce a set of lending, liquidity provider, and governance token vaults to demonstrate the protocol's capabilities.
- **Token Sale for a Fixed Price:** Offer \$EMLD in a token sale at a fixed price to ensure fair distribution while raising initial funding.

Phase 3: Integration and Expansion

With the protocol launched, focus shifts toward deepening its integration with DeFi systems and expanding its offerings to maximize utility and scalability.

- **Integrate into a ve(3,3) DEX:** Integrate \$EMLD into a ve(3,3) DEX to enhance liquidity and establish a sustainable flywheel effect through emissions and bribes..
- **Direct a Portion of Revenue Toward Bribes:** Allocate part of the protocol's revenue to fund bribes on ve(3,3) DEXs, incentivizing liquidity providers and increasing token utility.

Phase 4: Continuous Growth

Emerald Finance is designed for ongoing innovation, with a commitment to continuously creating and optimizing vaults to meet user needs and evolving market demands.

- **Create More Vaults Indefinitely:** Develop new vault strategies and expand the range of supported assets to provide users with diversified yield opportunities.

5. Conclusion

Emerald Finance presents a comprehensive solution to the complexities of yield farming and staking in decentralized finance. By combining automation, transparency, and innovative vault strategies, the protocol simplifies user engagement while maximizing returns. With its ERC-4626-compliant architecture, Emerald Finance offers seamless integration with DeFi platforms, enabling efficient lending, liquidity provision, and governance staking. The introduction of leveraged staking vaults and yield-bearing tokens further enhances user opportunities by amplifying capital efficiency and delivering sustainable growth.

The Emerald Finance token serves as a cornerstone of the protocol, tying value directly to protocol revenue while offering features like minting, burning, and collateralization. Its integration with ve(3,3) systems, support for arbitrage opportunities, and transparent APY structure make it a versatile asset for users seeking both liquidity and long-term value.

Through its commitment to user accessibility, Emerald Finance delivers a streamlined experience that includes real-time performance metrics, clear net APY calculations, and educational resources tailored to all levels of DeFi expertise. The protocol's roadmap underscores a focus on scalability and continuous improvement, with plans for multi-chain integration, expanded vault offerings, and further automation.

As decentralized finance evolves, Emerald Finance remains positioned to adapt and grow, offering users a reliable, efficient, and accessible platform to navigate the ever-changing landscape of DeFi yield optimization.