



DeFi Token Staking & Swap Platform

A Blockchain Honors Project

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The Problem with Traditional Finance

Centralized Control

Single points of failure create systemic risk and vulnerability to attacks or mismanagement.

High Fees

Intermediaries extract significant value through transaction fees, reducing returns for users.

Limited Access

Billions lack access to financial services due to geographic, regulatory, or economic barriers.

Opacity

Users must trust institutions blindly with minimal transparency into operational mechanics.

Our Solution

A decentralized platform enabling trustless token staking and peer-to-peer swapping without intermediaries.



Project Overview

A full-stack DeFi application built with production-grade security and intuitive user experience, featuring custom tokens, staking mechanisms, and decentralized exchange functionality.

Custom Tokens

ERC-20 compliant DFI and REW tokens with 1M supply each

Staking Engine

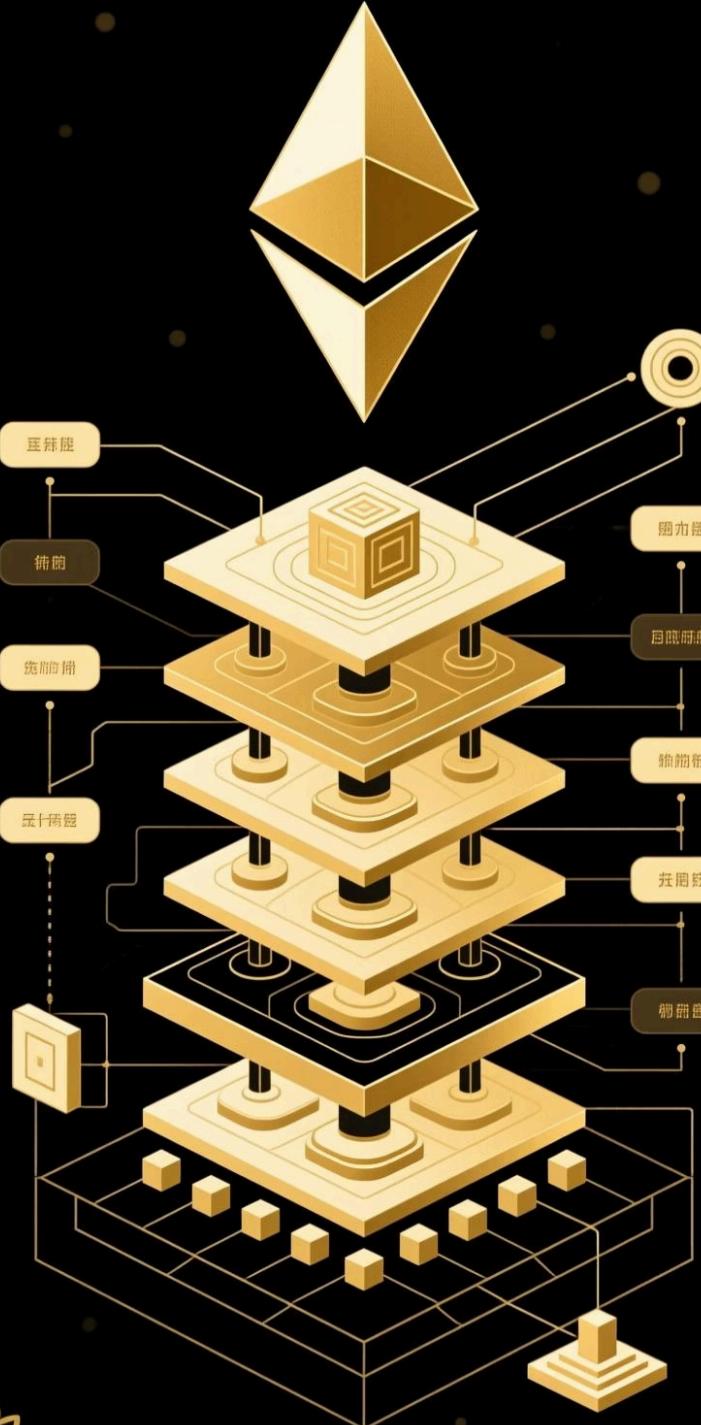
Time-based reward distribution system with real-time calculations

Token Exchange

Decentralized swap with fixed rate and instant execution

Modern Frontend

React-powered interface with MetaMask wallet integration



System Architecture

User Interface

React.js frontend with responsive design and real-time state management

Wallet Layer

MetaMask integration for secure transaction signing and account management

Blockchain Network

Ethereum blockchain providing immutable ledger and smart contract execution

Smart Contracts

Three specialized contracts handling tokens, staking, and swaps with security protocols



Smart Contract #1:

DeFiToken

ERC-20 Token Implementation

Specifications

- Initial supply: 1,000,000 tokens
- 18 decimal places (standard)
- OpenZeppelin ERC-20 base
- Secure transfer mechanisms

Core Functions

- `transfer()` - Send tokens
- `approve()` - Grant allowance
- `balanceOf()` - Check balance
- `totalSupply()` - Total issued



Smart Contract #2: StakingPool

Token Staking with Time-Based Rewards

Users stake DFI tokens to earn REW rewards calculated continuously based on stake duration and amount.

1 Stake Mechanism

Deposit DFI tokens into the pool, tracked with timestamp for reward calculation

2 Reward Formula

$$(\text{Staked Amount} \times \text{Time} \times \text{Rate}) / 100 - 1\% \text{ per second yield}$$

3 Flexible Withdrawal

Withdraw principal anytime; claim accumulated rewards independently

4 Security Protection

ReentrancyGuard prevents reentrancy attacks during withdrawals



Smart Contract #3: TokenSwap

Decentralized Token Exchange

Exchange Mechanism

Direct peer-to-peer token swapping at fixed rate with no intermediaries or slippage.

1 DFI = 2 REW

Key Features

- Instant execution
- Liquidity pool management
- Bidirectional swapping
- Transparent rate



Technology Stack



Smart Contracts

Solidity 0.8.20, Hardhat environment, OpenZeppelin libraries, Ethers.js blockchain interaction



Frontend

React 18.x, React Router navigation, CSS3 styling, MetaMask wallet integration



Blockchain

Ethereum network with Ropsten testnet for development and testing phases

Key Platform Features

1 Token Management

View DFI and REW balances with real-time updates reflecting all transactions and staking rewards.

2 Staking System

Deposit tokens to earn rewards, withdraw principal anytime, claim accumulated REW independently.

3 Token Swap

Exchange DFI and REW tokens instantly at fixed 1:2 rate with transparent mechanisms.

4 Portfolio Dashboard

Track all holdings, view transaction history, monitor staking performance, and manage assets.



Security Implementation

Production-grade security through battle-tested libraries, protective patterns, and comprehensive validation ensuring trustless operation.

OpenZeppelin

Audited, industry-standard contracts

ReentrancyGuard

Attack prevention mechanism

Input Validation

Comprehensive parameter checks

Safe Math

Overflow protection built-in

Access Control

Proper permission enforcement

Error Handling

Graceful failure recovery