TOKEN STAKING PLATFORM

A Decentralized Staking Protocol on Ethereum

Built on Ethereum | Sepolia Testnet
October 2025

Project Overview

Token Staking Platform is a decentralized application built on Ethereum that enables users to stake STK tokens and earn RWD tokens as rewards. The entire system operates through smart contracts, requiring no intermediaries or centralized control.

Key Features

Stake & Earn
Lock your STK tokens to earn RWD rewards automatically

Dynamic APY
Returns adjust based on total pool size and participation

Time-Locked
24-hour minimum staking period ensures stability

Real-Time Rewards
Watch your rewards accumulate every second

MetaMask Integration
Seamless wallet connection and transaction signing

Multi-Network
Supports both local development and Sepolia testnet

How It Works

1 Connect Wallet
Connect your MetaMask wallet to the platform. The system automatically detects your network (Localhost or Sepolia) and loads the appropriate smart contracts.

2 Stake Tokens
Deposit your STK tokens into the staking contract. Tokens are locked for a minimum of 24 hours to ensure pool stability and fair reward distribution.

3 Earn Rewards
Rewards automatically accumulate in real-time based on your staked amount, time staked, and the global reward rate. Watch your balance grow every second.

4 Claim & Unstake
Claim your RWD rewards anytime without unstaking. After 24 hours, withdraw your staked STK tokens along with any remaining rewards.

Reward Calculation

Formula: User Rewards = (Staked Amount × Time × Reward Rate) / Total Pool Size

The platform uses a time-weighted calculation to ensure fair distribution. The longer you stake and the more you contribute to the pool, the higher your rewards.

Technical Architecture

StakeToken (STK)
- ERC20 Standard Token
- Max Supply: 1,000,000 STK
- Faucet for Testing (100 STK/day)
- Mint & Transfer Functions

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StakingRewards (Core)
- Manages Staking Logic
- Calculates Rewards in Real-Time
- Enforces 24-Hour Time Lock
- Distributes RWD Tokens
- Security: ReentrancyGuard, Pausable

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RewardToken (RWD)
- ERC20 Reward Token
- Max Supply: 10,000,000 RWD
- Distributed as Staking Rewards
- Controlled Minting Access

Technology Stack

Smart Contracts
Solidity 0.8.20
OpenZeppelin Libraries

Development Framework
Hardhat v3
TypeScript Support

Frontend
React.js
Modern Component Architecture

Blockchain Interaction
Ethers.js v6
Web3 Provider Integration

Testing
Mocha & Chai
Automated Test Suite

Network
Ethereum
Hardhat Local & Sepolia Testnet

Security Features

ReentrancyGuard
Protection against recursive call attacks

Pausable
Emergency stop functionality for critical situations

Time Locks
24-hour minimum prevents flash loan attacks

SafeERC20
Secure token transfer mechanisms

Deployment Information

3	2	~1.2K
Smart Contracts	Networks	Lines of Code

Sepolia Testnet Deployment

StakeToken (STK)
`0xEa3AeFCcd8d0418f585eb908D4D0394c8Db088Ed`

RewardToken (RWD)
`0xc0608443bA7E80Cc04f4a4C678bD24B174749CE4`

StakingRewards (Main Contract)
`0xD3EDd8B346Ec305C61D55a32c408f2B88c5b9188`

Configuration

Lock Period
24 hours minimum

Reward Pool
500,000 RWD tokens

Faucet Limit
100 STK per day

Network RPC
Alchemy API

User Interface

The platform features a clean, intuitive interface built with React. Users can connect their MetaMask wallet, view real-time statistics, and interact with the staking contract through a simple, card-based layout.

Interface Components

Wallet Connection
One-click MetaMask integration with automatic network detection. The interface displays connected wallet address and current network (Localhost or Sepolia).

Statistics Dashboard
Real-time display of total pool size, current APY, personal STK balance, and earned RWD rewards. Updates automatically every 5 seconds.

Action Cards
Three main interaction areas: Stake tokens, Unstake tokens, and Claim rewards. Each card shows relevant balances and provides clear call-to-action buttons.

Transaction Notifications
Toast notifications inform users of transaction status (pending, confirmed, failed) with clear, friendly messages.

Use Cases

Long-term Holders
Users who believe in the STK token can stake their holdings to earn passive income through RWD rewards while maintaining their position.

Learning DeFi
Educational platform for understanding staking mechanics, smart contract interactions, and decentralized finance concepts in a safe testnet environment.

Testing & Development
Developers can use this platform to understand staking contract architecture and test Web3 integrations with real blockchain interactions.

Portfolio Diversification
Earn different tokens (RWD) by staking your existing tokens (STK), creating opportunities for portfolio diversification.

Project Summary

Token Staking Platform demonstrates a complete end-to-end DeFi application, from smart contract development to frontend integration. The project showcases modern Web3 development practices, security patterns, and user experience design.

Built with industry-standard tools and frameworks, the platform is deployed on Ethereum's Sepolia testnet and accessible through any Web3-enabled browser. The modular architecture allows for easy extensions and modifications to suit different use cases.

GitHub Repository
github.com/FadiTayih/token-staking-platform