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Smart Contract Audit Report

- Quick check -

Vyper Protocol

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DEFIMOON PROJECT

Audit and Development

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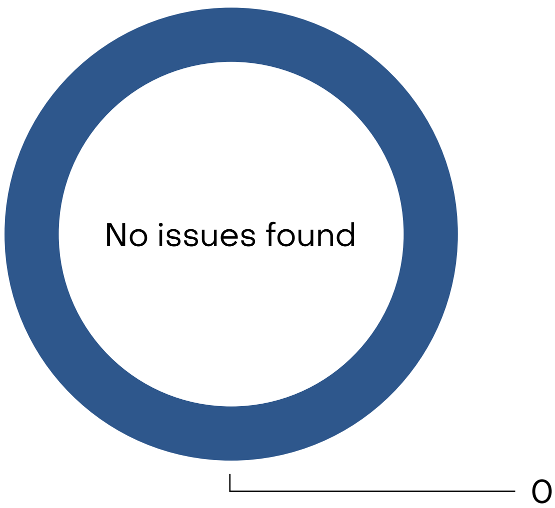
This quick audit report was prepared by DefiMoon for Vyper OTC.

Audit information

Description	Rust-based smart contract for an OTC token trading system
Audited files	All src files
Timeline	31 March 2023 - 1 April 2023
Website	https://www.vyperprotocol.io/
Languages	Rust
Methods	Architecture Review, Unit Testing, Functional Testing, Manual Review
Source code	https://github.com/vyper-protocol/vyper-otc/tree/81fa7b4d10131afdf323a0d8ecf4e856b8dda404
Chain	Solana
Status	Passed



	High Risk	A fatal vulnerability that can cause the loss of all Tokens / Funds.
	Medium Risk	A vulnerability that can cause the loss of some Tokens / Funds.
	Low Risk	A vulnerability which can cause the loss of protocol functionality.
	Informational	Non-security issues such as functionality, style, and convention.

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Audit Information

Defimoon utilizes both manual and automated auditing approach to cover the most ground possible. We begin with generic static analysis automated tools to quickly assess the overall state of the contract. We then move to a comprehensive manual code analysis, which enables us to find security flaws that automated tools would miss. Finally, we conduct an extensive unit testing to make sure contract behaves as expected under stress conditions.

In our decision making process we rely on finding located via the manual code inspection and testing. If an automated tool raises a possible vulnerability, we always investigate it further manually to make a final verdict. All our tests are run in a special test environment which matches the "real world" situations and we utilize exact copies of the published or provided contracts.

While conducting the audit, the Defimoon security team uses best practices to ensure that the reviewed contracts are thoroughly examined against all angles of attack. This is done by evaluating the codebase and whether it gives rise to significant risks. During the audit, Defimoon assesses the risks and assigns a risk level to each section together with an explanatory comment.

Audit overview

This quick audit report covers the review of a Rust-based smart contract for an over-the-counter (OTC) token trading system. The smart contract leverages the Anchor framework and the Solana blockchain network for its operation. The project structure consists of several files organized under the `instructions` and `state` directories.

The report provides a detailed analysis of each file, identifying any security issues, vulnerabilities, and best development practices used in the code. It also includes a summary of the overall security and quality of the smart contract.

Project Structure:

- instructions/
  - claim.rs
  - deposit.rs
  - initialize.rs
  - mod.rs
  - settle.rs
  - withdraw.rs
- state/
  - mod.rs
  - ots.state.rs
- errors.rs
- lib.rs

File-by-File Analysis and Recommendations

- *instructions/claim.rs*

The `claim.rs` file is responsible for allowing users to claim tokens from the senior or junior reserve after a settlement has been executed. The code is well-written, secure, and follows best development practices. No security issues, vulnerabilities, or optimization opportunities were identified.

- *instructions/deposit.rs*

The `deposit.rs` file handles the deposit and token transfer logic for senior and junior tranches in the OTC trading system. The code appears to be well-written, secure, and follows best development practices. No significant security vulnerabilities were found during the review.

- *instructions/initialize.rs*

The `initialize.rs` file is responsible for initializing the OTC state. The code checks for correct time sequences and requires that only the owner of the tranche configuration can execute deposits and redeems. It also ensures the correct initialization of OTC state and accounts using the Anchor framework. No apparent vulnerabilities were identified.

- *instructions/settle.rs*

The `settle.rs` file is responsible for the settlement process. The code appears to follow best development practices and uses relevant approaches.

- *instructions/withdraw.rs*

The `withdraw.rs` file is responsible for the withdrawal functionality. The code uses best development practices and relevant approaches in Rust smart contract development. The use of the Anchor framework and the Solana blockchain provides a secure and efficient environment for the smart contract.

- *state/otc_state.rs*

The `otc_state.rs` file defines the state of the OTC contract with various fields. The code doesn't have any apparent security vulnerabilities as it's primarily focused on defining the state of the OTC contract. No vulnerabilities or optimization opportunities were identified.

- *errors.rs*

The `errors.rs` file defines custom error codes and their associated error messages for the Vyper OTC smart contract. The code follows best practices for defining custom error types in Rust using the `anchor_lang` crate. No issues, vulnerabilities, or optimization opportunities were identified.

- *lib.rs*

The `lib.rs` file serves as the main entry point for the smart contract and defines several instruction handlers for interacting with the OTC system. The code appears to be reasonably secure and follows best development practices. No vulnerabilities or optimization opportunities were identified.

No critical vulnerabilities or bugs were identified in the provided code.
No optimization opportunities were identified in the provided code.

Summary

Overall, the Vyper OTC smart contract code appears to be well-written, secure, and follows best development practices. The use of the Anchor framework and the Solana blockchain network ensures a robust and efficient environment for the smart contract.

No critical vulnerabilities, bugs, or optimization opportunities were identified during the review. However, it is essential to keep track of any changes in the Solana ecosystem and the Anchor framework to ensure continued compatibility and adherence to best practices

Application security checklist

Compiler errors	Passed
Possible delays in data delivery	Passed
Timestamp dependence	Passed
Integer Overflow and Underflow	Passed
Race Conditions and Reentrancy	Passed
DoS with Revert	Passed
DoS with block gas limit	Passed
Methods execution permissions	Passed
Private user data leaks	Passed
Malicious Events Log	Passed
Scoping and Declarations	Passed
Uninitialized storage pointers	Passed
Arithmetic accuracy	Passed
Design Logic	Passed
Cross-function race conditions	Passed

Detailed Audit Information

Contract Programming

Integer overflow/underflow	Passed
Function input parameters lack of check	Passed
Function input parameters check bypass	Passed
Function access control lacks management	Passed
Critical operation lacks event log	Passed
Human/contract checks bypass	Passed
Random number generation/use vulnerability	Passed
Fallback function misuse	Passed
Race condition	Passed
Logical vulnerability	Passed
Other programming issues	Passed

Code Specification

Visibility not explicitly declared	Passed
Variable storage location not explicitly declared	Passed
Use keywords/functions to be deprecated	Passed
Other code specification issues	Passed

Gas Optimization

Assert () misuse	Passed
High consumption ‘for/while’ loop	Passed
High consumption ‘storage’ storage	Passed
“Out of Gas” Attack	Passed

Automated Analyses

Slither

Slither's automatic analysis not found vulnerabilities, or these false positives results .

Methodology

Manual Code Review

We prefer to work with a transparent process and make our reviews a collaborative effort. The goal of our security audits is to improve the quality of systems we review and aim for sufficient remediation to help protect users. The following is the methodology we use in our security audit process.

Vulnerability Analysis

Our audit techniques include manual code analysis, user interface interaction, and whitebox penetration testing. We look at the project's web site to get a high-level understanding of what functionality the software under review provides. We then meet with the developers to gain an appreciation of their vision of the software. We install and use the relevant software, exploring the user interactions and roles. While we do this, we brainstorm threat models and attack surfaces. We read design documentation, review other audit results, search for similar projects, examine source code dependencies, review open issue tickets, and investigate details other than the implementation.

Documenting Results

We follow a conservative, transparent process for analyzing potential security vulnerabilities and seeing them through successful remediation. Whenever a potential issue is discovered, we immediately create an Issue entry for it in this document, even though we have not yet verified the feasibility and impact of the issue. This process is conservative because we document our suspicions early even if they are later shown to not represent exploitable vulnerabilities. We follow a process of first documenting the suspicion with unresolved questions, then confirming the issue through code analysis, live experimentation, or automated tests. Code analysis is the most tentative, and we strive to provide test code, log captures, or screenshots demonstrating our confirmation. After this we analyze the feasibility of an attack in a live system to make a final decision.

Suggested Solutions

We search for immediate mitigations that live deployments can take, and finally we suggest the requirements for remediation engineering for future releases. The mitigation and remediation recommendations should be scrutinized by the developers and deployment engineers, and successful mitigation and remediation is an ongoing collaborative process after we deliver our report, and before the details are made public.

Appendix A — Finding Statuses

Resolved	Contracts were modified to permanently resolve the finding
Mitigated	The finding was resolved by other methods such as revoking contract ownership or updating the code to minimize the effect of the finding
Acknowledged	Project team is made aware of the finding
Open	The finding was not addressed