HACKEN

SMART CONTRACT CODE REVIEW AND SECURITY ANALYSIS REPORT

Customer: ALPHR Finance
Date: June 1st, 2021

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Document

Name	Smart Contract Code Review and Security Analysis Report for ALPHR Finance
Type	Manual trading and staking contracts
Platform	Ethereum / Solidity
Methods	Architecture Review, Functional Testing, Computer-Aided Verification, Manual Review
Approved by	Andrew Matiukhin | CTO and co-founder Hacken
Repository 1	https://github.com/alphr-finance/alphr-contracts-LPs-rewards
Commit	059b7cf915b592e3e7a199f4c51693d00479e0aa
Repository 2	https://github.com/alphr-finance/alphr-contracts-MMT
Commit	a77e1e5f74c5ca4d766e3bcafcfc71fc6510ad6f
Timeline	28TH MAY 2021 - 1ST JUN 2021
Changelog	1ST JUN 2021 - Initial Audit

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Introduction

Hacken OÜ (Consultant) was contracted by ALPHR Finance (Customer) to conduct a Smart Contract Code Review and Security Analysis. This report presents the findings of the security assessment of Customer`s smart contract and its code review conducted between May 28th, 2021 - June 1st, 2021.

Scope

The scope of the project can be found in following repositories:

```
Repository 1: https://github.com/alphr-finance/alphr-contracts-LPs-rewards
Commit 1: 059b7cf915b592e3e7a199f4c51693d00479e0aa
Repository 2: https://github.com/alphr-finance/alphr-contracts-MMT
Commit 2: a77e1e5f74c5ca4d766e3bcafcfc71fc6510ad6f
```

We have scanned this smart contract for commonly known and more specific vulnerabilities. List of the commonly known vulnerabilities that are considered:

Category	Check Item
Code review	▪ Reentrancy ▪ Ownership Takeover ▪ Timestamp Dependence ▪ Gas Limit and Loops ▪ DoS with (Unexpected) Throw ▪ DoS with Block Gas Limit ▪ Transaction-Ordering Dependence ▪ Style guide violation ▪ Costly Loop ▪ ERC20 API violation ▪ Unchecked external call ▪ Unchecked math ▪ Unsafe type inference ▪ Implicit visibility level ▪ Deployment Consistency ▪ Repository Consistency ▪ Data Consistency
Functional review	▪ Business Logics Review ▪ Functionality Checks ▪ Access Control & Authorization ▪ Escrow manipulation ▪ Token Supply manipulation ▪ Assets integrity ▪ User Balances manipulation ▪ Data Consistency manipulation ▪ Kill-Switch Mechanism ▪ Operation Trails & Event Generation

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Executive Summary

According to the assessment, the Customer's smart contracts are well-secured.

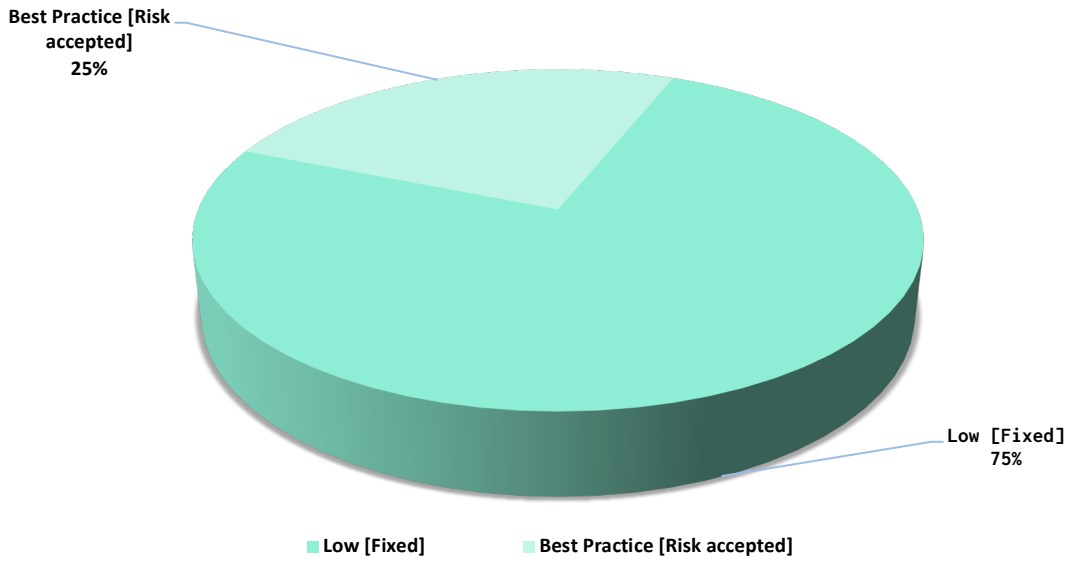
Insecure	Poor secured	Secured	Well-secured

You are here

Our team performed an analysis of code functionality, manual audit, and automated checks with Mythril and Slither. All issues found during automated analysis were manually reviewed and important vulnerabilities are presented in the Audit overview section. A general overview is presented in AS-IS section and all found issues can be found in the Audit overview section.

Security engineers found 3 security issues during the audit that were fixed in the latest commit. All these risks were covered by customer after the audit - only the info issue was accepted by Customer.

Graph 1. The distribution of vulnerabilities.



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Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to assets lose or data manipulations.
High	High-level vulnerabilities are difficult to exploit; however, they also have significant impact on smart contract execution, e.g. public access to crucial functions
Medium	Medium-level vulnerabilities are important to fix; however, they can't lead to assets lose or data manipulations.
Low	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can't have significant impact on execution
Lowest / Code Style / Best Practice	Lowest-level vulnerabilities, code style violations and info statements can't affect smart contract execution and can be ignored.

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Audit overview

Critical

No critical issues were found.

High

No high issues were found.

Medium

No medium issues were found.

Low

1. **[Fixed]** Unused imports in FeeStorage.sol - AccessControl.sol and EnumerableSet.sol. It's recommended to remove unused imports from the code.
2. **[Fixed]** Add send and sendToken function for the FeeStorage in order to prevent bathed transfer DoS.
3. **[Fixed]** Use call instead of transfer for Ethereum transfers.

Lowest / Code style / Best Practice

[Accepted by Customer] Inline documentation is not present for all of the smart contracts functions.

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Conclusion

Smart contracts within the scope was manually reviewed and analyzed with static analysis tools.

Audit report contains all found security vulnerabilities and other issues in the reviewed code.

Security engineers found 3 security issues and 1 code style issue during the audit that were fixed in the latest commit. All these risks were covered by customer after the audit - only the info issue was accepted by Customer.

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Disclaimers

Hacken Disclaimer

The smart contracts given for audit have been analyzed in accordance with the best industry practices at the date of this report, in relation to cybersecurity vulnerabilities and issues in smart contract source code, the details of which are disclosed in this report, (Source Code); the Source Code compilation, deployment and functionality (performing the intended functions).

The audit makes no statements or warranties on security of the code. It also cannot be considered as a sufficient assessment regarding the utility and safety of the code, bugfree status or any other statements of the contract. While we have done our best in conducting the analysis and producing this report, it is important to note that you should not rely on this report only - we recommend proceeding with several independent audits and a public bug bounty program to ensure security of smart contracts.

Technical Disclaimer

Smart contracts are deployed and executed on blockchain platform. The platform, its programming language, and other software related to the smart contract can have own vulnerabilities that can lead to hacks. Thus, the audit can’t guarantee explicit security of the audited smart contracts.