HACKEN

SMART CONTRACT CODE REVIEW AND SECURITY ANALYSIS REPORT

Customer: Inventuna Teknoloji A.S.
Date: February 21ie, 2022

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Document

Name	Smart Contract Code Review and Security Analysis Report for Inventuna Teknoloji A.S.
Approved by	Andrew Matiukhin | CTO Hacken OU
Type	Staking
Platform	Avalanche / Solidity
Methods	Architecture Review, Functional Testing, Computer-Aided Verification, Manual Review
Deployed contract	https://testnet.snowtrace.io/address/0x1d503dba4c0051b87508a5dad927062c36596567
Technical Documentation	NO
JS tests	NO
Website	https://heroeschained.com
Timeline	14 FEBRUARY 2022 - 21 FEBRUARY 2022
Changelog	16 FEBRUARY 2022 - Initial Audit 21 FEBRUARY 2022 - Second Review

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Introduction

Hacken OÜ (Consultant) was contracted by Inventuna Teknoloji A.S. (Customer) to conduct a Smart Contract Code Review and Security Analysis. This report presents the findings of the security assessment of the Customer's smart contract and its code review conducted between February 14th, 2022 - February 21st, 2022.

Scope

The scope of the project is smart contracts deployed to the AVAX testnet network:

Explorer URL:
https://testnet.snowtrace.io/address/0x1d503dba4c0051b87508a5dad927062c36596567#code
Technical Documentation: No
JS tests: No
Contracts:
HC_StakingForNFT_p1

We have scanned this smart contract for commonly known and more specific vulnerabilities. Here are some 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

Executive Summary

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

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. All found issues can be found in the Audit overview section.

As a result of the audit, security engineers found **1** low severity issue.

After the second review security engineers found that SafeMath library was replaced with the recent one which is for Solidity version >= 0.8.0. Therefore no security issues were found.

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Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to assets loss or data manipulations.
High	High-level vulnerabilities are difficult to exploit; however, they also have a 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 loss or data manipulations.
Low	Low-level vulnerabilities are mostly related to outdated, unused, etc. code snippets that can't have a significant impact on execution

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Audit overview

Critical

No critical issues were found.

High

No high severity issues were found.

Medium

No medium severity issues were found.

Low

Using SafeMath on solidity >=0.8.0

Starting Solidity v0.8.0 there's no need to check for uint to overflow while mathematical operations because this check is already built-in.

Recommendation: Please either discard SafeMath or use its version updated to use with Solidity 0.8 or later.

Status: Fixed.

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Conclusion

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

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

As a result of the audit, security engineers found **1** low severity issue.

After the second review security engineers found that SafeMath library was replaced with the recent one which is for Solidity version >= 0.8.0. Therefore no security issues were found.

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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 the security of the code. It also cannot be considered as a sufficient assessment regarding the utility and safety of the code, bug-free 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 the security of smart contracts.

Technical Disclaimer

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