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Smart Contract Audit Report

www.fragmentsnft.xyz

by - White Hat DAO
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This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report.

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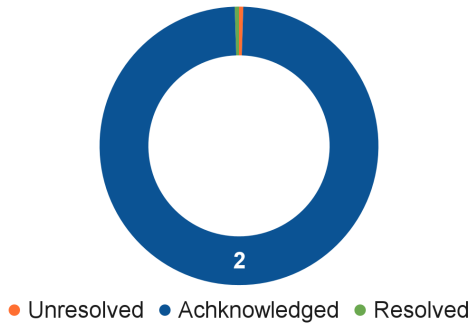
Executive Summary

White Hat DAO was contracted by "The Fragments NFTs" team to conduct a smart contract security audit. This report presents the findings of the security assessment conducted between April. 06, 2022 and April 16th, 2022. During this audit, the team manually reviewed one **(1)** smart contract and analyzed it with static analysis tools.

Based on results of the audit, the customers' smart contract safety rating is:

The White Hat DAO audit team has found 1 Informational and 1 Minor Issue. For the details of these issues please refer to the Findings section of the report.

Total Issues	2
Critical Issues	0 (0 Resolved)
Major Issues	0 (0 Resolved)
Medium Issues	0 (0 Resolved)
Minor Issues	1 Acknowledged
Informational	1 Acknowledged



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Summary of Findings

The most prominent audit findings were the Minor issues around the **"Use of Obsolete Function" and "Use of Insufficiently Random Values".** All issues regarding severities & vulnerabilities discovered by the audit process are listed as below:

Issue ID	Issue Title	Category	Severity	Status
FRAG-01	**Weak Source of Randomness**	Use of Insufficiently Random Values	Minor	Acknowledged
FRAG-02	**Authorization through tx.origin**	Use of Obsolete Function	informational	Acknowledged

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Introduction

This security audit assessment has been prepared for "Fragments NFTs". The purpose of this audit is to document and expose any safety concerns and vulnerabilities found in the source code which has been reviewed by the White Hat DAO (WHD) Audit team. This review includes any contract dependencies in scope that were not part of an officially recognized library. Comprehensive tests have been conducted, utilizing manual code review, and static analysis techniques.

The auditing process pays special attention to the following considerations:

- Testing the smart contract(s) against both common and uncommon attack vectors
- Assessing the codebase to ensure compliance with industry standards and best practices.
- Ensuring contract logic meets the specifications and intentions of the client. Cross-referencing contract structure and implementation against similar smart contracts produced by industry leaders
- Thorough line-by-line manual review of the entire codebase by industry experts
- Reviewing unit tests to ensure full coverage of the codebase provided to White Hat DAO

The Project Summary, Scope, Audit Details and Methodology of this audit is described within this document.

The security audit results can range from critical to informational. To ensure a high level of security standards, WHD recommends the client to address the findings contained in this report. The results can be found in the Findings section.

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Project Summary

Project	Fragments NFTs
Description	Fragments are an NFT experiment where each fragment is an on-chain generated deflationary partial cube object. The partial cubes can be combined with other NFTs to form a full cube. The system is based on the idea to leverage the ability of its participants and usage of ETH blockchain.
Website	https://fragmentsnft.xyz/
Platform	ETHEREUM
Language used	Solidity
Codebase	https://drive.google.com/file/d/1qjpV49rRqGRgP-IGlwvF-TZuQrZzG3-Y/view?usp=sharing

Project Scope

White Hat DAO was commissioned by The Fragments NFTs to perform security assessments on the smart contract listed below:

Source Code	Acknowledgement	SHA-256
CryptoartV1.sol	Accepted	3ad3640a6830cc93e9a56fe41e7bab8901033408b82abe32a110ddfb3a589c7c

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Audit Details

Delivery Date	29/04/2022
Received Date	06/04/2022
Key Components	CryptoartV1.sol

Methodology

The White Hat DAO Audit team reviewed the code base provided by The Fragments NFTs team between 06/04/ 2022 and 28/04/2022.

The White Hat DAO Audit team launched the audit by analyzing the specifications of the project and focusing on the key areas of interest while evaluating the documentation. The code was then manually reviewed in an attempt to identify potential vulnerabilities and verify the code has good unit tests coverage. The White Hat DAO Audit team wrote some unit cases to test some edge cases. Automated analysis of the codebase was performed and results were reviewed.

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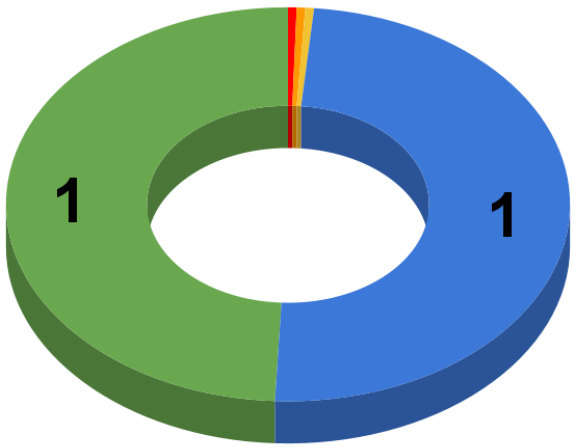
The smart contract provided by Fragment NFTs team was scanned for following list of vulnerabilities during the security assessment:

No	Vulnerability Tests	Status
# 1	Access Control	Passed
# 2	Arbitrary token minting	Passed
# 3	Business Logics Review	Passed
# 4	Centralization of power	Passed
# 5	Code clones, functionality duplication	Passed
# 6	Conditional Completion attack	Passed
# 7	Costly Loop	Passed
# 8	Ownership Takeover	Passed
# 9	Redundant fallback function	Passed
# 10	Reentrancy	Passed
# 11	Remote code execution	Passed
# 12	User Balances manipulation	Passed
# 13	Logic Flaws	Passed
# 14	Scoping and Declarations	Passed
# 15	Integer Overflow and Underflow attacks	Passed

Findings

The White Hat DAO Audit team found 1 minor and 1 informational vulnerabilities.

Vulnerabilities Found



Critical - 0 | Major - 0 | Medium Issue - 0 | Minor - 1 | Informational -1

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Severity Definitions

Severity	Definitions
Critical	Critical vulnerabilities have a catastrophic impact on the security of the project. They can lead to loss, data manipulation, take over, etc. It is strongly recommended to fix these vulnerabilities.
Major	Major vulnerabilities have a significant impact on the security of the project. They can lead to loss, data manipulation, take over, etc. It is strongly recommended to fix these vulnerabilities.
Medium	Medium vulnerabilities are important to fix. These vulnerabilities alone can't lead to asset loss or data manipulation. However, medium vulnerabilities can be chained to create a more severe vulnerability. It is highly recommended to review and address these vulnerabilities.
Minor	Minor vulnerabilities are mostly related to outdated, unused code snippets and don't have a significant impact on execution.
Informational	Informational vulnerabilities don't pose an immediate risk but are relevant to security best practices. They could be code-style violations and informational statements that don't affect smart contract execution. They may be able to be ignored.

Critical Vulnerabilities

No Critical severity vulnerabilities were found.

Major Vulnerabilities

No Major severity vulnerabilities were found.

Medium Vulnerabilities

No Medium severity vulnerabilities were found.

Minor Vulnerabilities

FRAG-01 | Weak Source of Randomness

Type: CWE-330: Use of Insufficiently Random Values
Level: Minor

Description: Ability to generate random numbers is very helpful in all kinds of applications. One obvious example is gambling DApps, where a pseudo-random number generator is used to pick the winner. However, creating a strong enough source of randomness in Ethereum is very challenging. For example, use of block.timestamp is insecure, as a miner can choose to provide any timestamp within a few seconds and still get his block accepted by others. Use of blockhash, block.difficulty and other fields is also insecure, as they're controlled by the miner. If the stakes are high, the miner can mine lots of blocks in a short time by renting hardware, pick the block that has required block hash for him to win, and drop all others.

Recommendation:

- Using a commitment scheme, e.g. RANDAO.
- Using external sources of randomness via oracles, e.g. Oraclize. Note that this approach requires trusting in oracle, thus it may be reasonable to use multiple oracles.
- Using Bitcoin block hashes, as they are more expensive to mine.

Informational Vulnerabilities

FRAG-02 | Authorization through tx.origin

Type: CWE-477: Use of Obsolete Function
Level: Informational

Description: **`tx.origin`** is a global variable in Solidity which returns the address of the account that sent the transaction. Using the variable for authorization could make a contract vulnerable if an authorized account calls into a malicious contract. A call could be made to the vulnerable contract that passes the authorization check since **`tx.origin`** returns the original sender of the transaction which in this case is the authorized account.

Recommendation: Leave as-is, this was flagged due to it being used for authentication most of the time. **`tx.origin`** is not being used for authentication in this instance, it's more for bot protection. This method also allows multi-sigs to be used like Gnoses due the calls coming from a contract where isContract() would limit all contracts and doesn't guarantee to stop the attacker.

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Conclusion

White Hat DAO worked with The Fragment NFTs team to perform this audit. One smart contract was reviewed during this audit. The smart contract was manually reviewed and analyzed with static analysis tools. The findings of these reviews are provided in this report.

No unit tests were provided. We constructed some unit tests to test edge cases. The code was commented well. Comments are helpful in understanding the overall architecture and the logic flow of the contracts.

During the audit of the smart contract provided by The Fragment NFTs team, the White Hat DAO audit team found a total of 2 vulnerabilities, which have been detailed in this report.

Change Log

- 13-04-2022 - Initial report. - JaxCoder
- 14-04-2022 - Initial report- CompositeFellow
- 15-04-2022 - Initial report- White Hat

Audited by

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