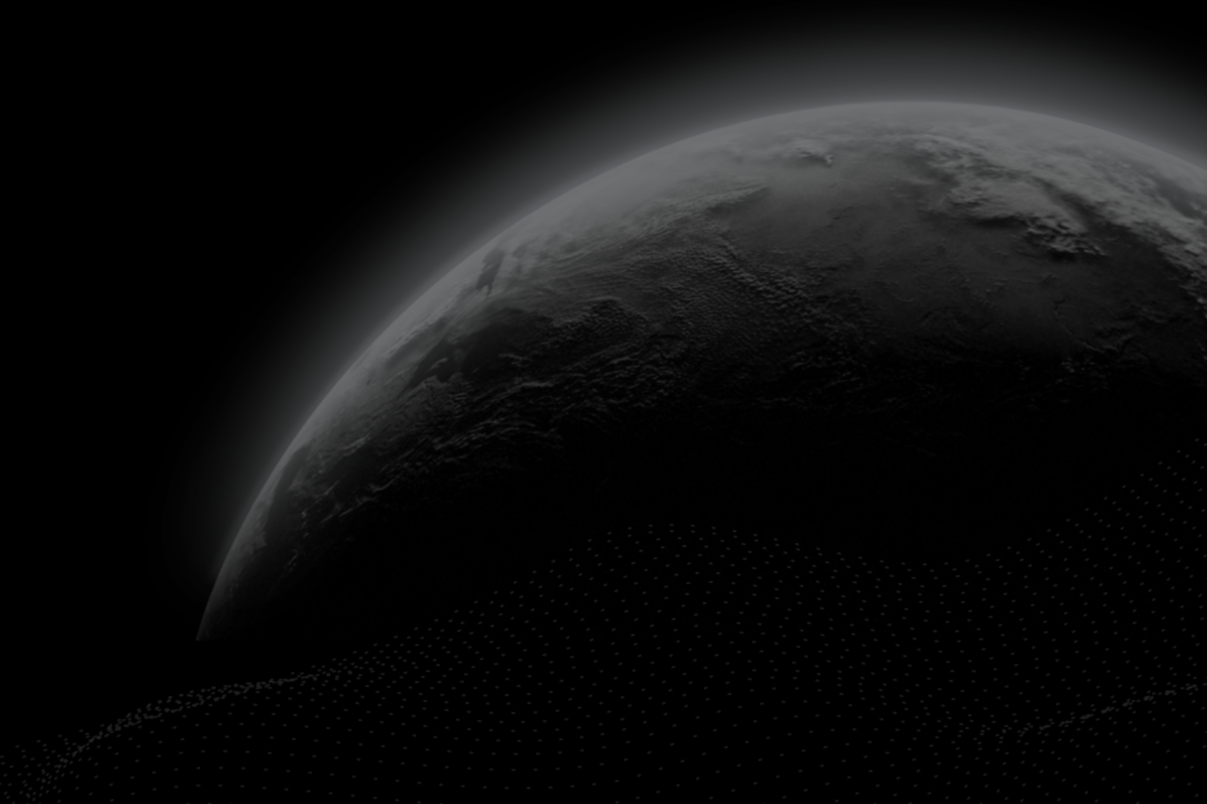
CERTIK

Security Assessment

Folks Finance - Audit 1

CertiK Verified on Dec 12th, 2022



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The security assessment was prepared by CertiK, the leader in Web3.0 security.

Executive Summary

TYPES	ECOSYSTEM	METHODS
DeFi	Algorand (ALGO)	Manual Review, Static Analysis

LANGUAGE	TIMELINE	KEY COMPONENTS
pyteal	Delivered on 12/12/2022	N/A

CODEBASE	COMMITS
https://github.com/blockchain-italia/ff-certik-contracts/tree/93b558080137fcf578acc9469cc4df682612baed/contracts/f_staking ...View All	93b558080137fcf578acc9469cc4df682612baed ...View All

Vulnerability Summary

3	0	1	0	2	0	0
Total Findings	Resolved	Mitigated	Partially Resolved	Acknowledged	Declined	Unresolved

🟥	0	Critical		Critical risks are those that impact the safe functioning of a platform and must be addressed before launch. Users should not invest in any project with outstanding critical risks.
🟧	1	Major	1 Mitigated	Major risks can include centralization issues and logical errors. Under specific circumstances, these major risks can lead to loss of funds and/or control of the project.
🟨	0	Medium		Medium risks may not pose a direct risk to users' funds, but they can affect the overall functioning of a platform.
🟨	1	Minor	1 Acknowledged	Minor risks can be any of the above, but on a smaller scale. They generally do not compromise the overall integrity of the project, but they may be less efficient than other solutions.
🟦	1	Informational	1 Acknowledged	Informational errors are often recommendations to improve the style of the code or certain operations to fall within industry best practices. They usually do not affect the overall functioning of the code.

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CODEBASE | FOLKS FINANCE - AUDIT 1

Repository

https://github.com/blockchain-italia/ff-certik-contracts/tree/93b558080137fcf578acc9469cc4df682612baed/contracts/f_staking

Commit

93b558080137fcf578acc9469cc4df682612baed

AUDIT SCOPE | FOLKS FINANCE - AUDIT 1

9 files audited ● 1 file with Acknowledged findings ○ 8 files without findings

ID	File	SHA256 Checksum
● FCK	projects/FolksFinance/contracts/f_staking/f_staking.py	d6ab0350d508b544f02692d2748d1248828828a760cf8cdd68c7bd0fd508fe0e
○ FFK	projects/FolksFinance/contracts/f_staking/__init__.py	
○ FFP	projects/FolksFinance/contracts/f_staking/f_staking.json	e9d3696c85c18ff058864200740edcbe32b108bd1404cd5f10f6af89854a079f
○ FCP	projects/FolksFinance/contracts/f_staking/f_staking_state.py	bd4e19b5c904a1fa2c44833519e14b79d3cfae81e316f6c84cdb5dbcdb612ba1
○ CKP	projects/FolksFinance/contracts/common/helpers/__init__.py	
○ ARR	projects/FolksFinance/contracts/common/helpers/array.py	0b037ee09d7de3aa953e7fdac675a27924b7d7d47ed9ee803054326c919d206a
○ INN	projects/FolksFinance/contracts/common/inner_txn.py	c3b9e2f272c6827999b50f0d520f9beb40449b28605952a44bcad5e4d9c1bd4b
○ CHE	projects/FolksFinance/contracts/common/checks.py	3772aae23900ffec0d8229e2b06db2c974d571f6bc7fe6dd7bb023c5c0ba497e
○ MAT	projects/FolksFinance/contracts/common/math_lib.py	b2747abbedd34dc0457f3866b280fc1eea1b737a5eb1987b73dafa30b4a4e141

APPROACH & METHODS | FOLKS FINANCE - AUDIT 1

This report has been prepared for Folks Finance - Audit 1 to discover issues and vulnerabilities in the source code of the Folks Finance - Audit 1 project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Manual Review and Static Analysis techniques.

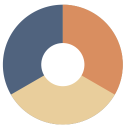
The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- 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.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Testing the smart contracts against both common and uncommon attack vectors;
- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

FINDINGS | FOLKS FINANCE - AUDIT 1



3	0	1	0	1	1
Total Findings	Critical	Major	Medium	Minor	Informational

This report has been prepared to discover issues and vulnerabilities for Folks Finance - Audit 1. Through this audit, we have uncovered 3 issues ranging from different severity levels. Utilizing the techniques of Manual Review & Static Analysis to complement rigorous manual code reviews, we discovered the following findings:

ID	Title	Category	Severity	Status
FCK-01	**Centralization Related Risks**	**Centralization / Privilege**	**Major**	● **Mitigated**
FCK-02	Potential Loss Of Precision	Mathematical Operations	Minor	● Acknowledged
GLOBAL-01	Out Of Scope Dependencies	Volatile Code	Informational	● Acknowledged

FCK-01 | CENTRALIZATION RELATED RISKS

Category	Severity	Location	Status
Centralization / Privilege	● **Major**	**projects/FolksFinance/contracts/f_staking/f_staking.py: 251 , 265, 292, 354, 378, 410**	● **Mitigated**

Description

In the contract `f_staking` , the role `admin` has authority over the following functions:

- function update_admin()
- function add_staking_program()
- function add_reward_asset()
- function update_end()
- function update_reward_rate()
- function withdraw_rewards()

Any compromise to the admin account may allow a hacker to take advantage of this authority and cause the malfunction of the protocol.

In addition, there is no guarantee that there is enough reward balance in the application. The admin can withdraw rewards at any time for any amount by calling function `withdraw_rewards` , and users might not get rewards for the time they already staked.

Recommendation

The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralization, which in most cases cannot be resolved entirely at the present stage. We recommend carefully managing the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., multi-signature wallets.

Indicatively, here are some feasible suggestions that would also mitigate the potential risk at a different level in terms of long-term and permanent:

Long Term:

- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key compromised;
  AND

- Introduction of a DAO/governance/voting module to increase transparency and user involvement;
  AND
- A medium/blog link for sharing the multi-signers addresses and DAO information with the public audience.

Permanent:

Renouncing the ownership or removing the function can be considered *fully resolved*.

- Renounce the ownership and never claim back the privileged roles;
  OR
- Remove the risky functionality.

Alleviation

[Folks Finance Team]:

We use a multisig account Q5Q5FC5PTYQIUX5PGNTEW22UJHJHVVUEMMWV2LSG6MGT33YQ54ST7FEIGA.

Building a DAO is on our upcoming roadmap.

FCK-02 | POTENTIAL LOSS OF PRECISION

Category	Severity	Location	Status
Mathematical Operations	● Minor	projects/FolksFinance/contracts/f_staking/f_staking.py: 54~58, 79	● Acknowledged

Description

In the function `update_reward_per_token` , the timestamp is converted to uint32 in line 79 and stored to the reward array, which will cause precision loss during the conversion. The stored timestamp is used to compared with `Global.latest_timestamp()` . If the precision loss is substantial, the result of the comparison might be affected.

Recommendation

We recommend the team elaborate the reason behind the conversion.

Alleviation

[Folks Finance Team]: The reason why we use uint32 is because it saves on limited storage space in global state. A uint32 supports unix time till year 2106 so there is no concern with using it.

GLOBAL-01 | OUT OF SCOPE DEPENDENCIES

Category	Severity	Location	Status
Volatile Code	● Informational		● Acknowledged

Description

The scope of the audit treats out-of-scope Folks finance pool contracts as black boxes and assumes their functional correctness. However, in the real world, those contracts can be compromised and this may lead to lost or stolen assets. Additionally, upgrades of those contracts can possibly create severe impacts.

Recommendation

The aforementioned contracts are out of the audit scope. We encourage the team to constantly monitor the statuses of those contracts to mitigate the side effects when unexpected activities are observed.

Alleviation

[Folks Finance Team]:

These smart contracts have / are being audited by two other firms.

APPENDIX | FOLKS FINANCE - AUDIT 1

Finding Categories

Categories	Description
Centralization / Privilege	Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.
Mathematical Operations	Mathematical Operation findings relate to mishandling of math formulas, such as overflows, incorrect operations etc.
Volatile Code	Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that may result in a vulnerability.

Checksum Calculation Method

The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux "sha256sum" command against the target file.

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