CERTIK

Preliminary Comments

Tokensfarm #5

Mar 26th, 2022

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Summary

This report has been prepared for Tokensfarm #5 to discover issues and vulnerabilities in the source code of the Tokensfarm #5 project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review 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:

- 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.

Overview

Project Summary

Project Name	Tokensfarm #5
Platform	Ethereum
Language	Solidity
Codebase	https://github.com/Tokensfarm/tokensfarm-contracts
Commit	9bd6786534954268cd57f0f7d1125ff25126e9e1

Audit Summary

Delivery Date	Mar 26, 2022 UTC
Audit Methodology	Static Analysis, Manual Review

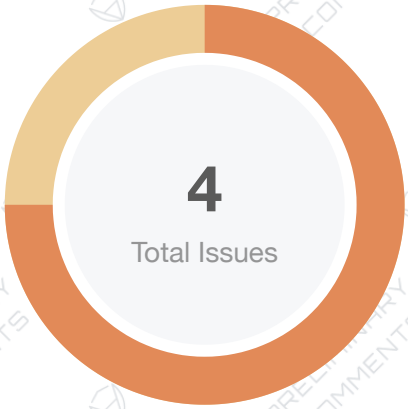
Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Mitigated	Resolved
Critical	0	0	0	0	0	0	0
Major	3	3	0	0	0	0	0
Medium	0	0	0	0	0	0	0
Minor	1	1	0	0	0	0	0
Informational	0	0	0	0	0	0	0
Discussion	0	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
IVF	contracts/IterativeVestingFarm.sol	a1d45b706f498e0e7b8f974922979997f1030273b69d8fb3341bb9d92ae92733
LVF	contracts/LinearVestingFarm.sol	7babf9742614abc01d2545ede7e6546d98385ddd1bcfb65004c1778844473c3a
TFF	contracts/TokensFarmFactory.sol	be3ec4bf4d44ca10f2ce94ab6c512afeaeb4089b07a673f9055b21de6e544f13

Findings



Critical	**0** (0.00%)
Major	**3** (75.00%)
Medium	**0** (0.00%)
Minor	**1** (25.00%)
Informational	**0** (0.00%)
Discussion	**0** (0.00%)

ID	Title	Category	Severity	Status
CON-01	Centralization Related Risks	**Centralization / Privilege**	**Major**	Pending
CON-02	Potential Front-Running Risk	Volatile Code	Minor	Pending
LVF-01	Incorrect `totalWithdrawn`	Logical Issue	Major	Pending
TFF-01	Centralized Control of Contract Upgrade	**Centralization / Privilege**	**Major**	Pending

CON-01 | Centralization Related Risks

Category	Severity	Location	Status
Centralization / Privilege	Major	contracts/IterativeVestingFarm.sol: 188, 227, 263, 290, 541, 576 contracts/LinearVestingFarm.sol: 141, 176, 212, 239, 254, 475, 510 contracts/TokensFarmFactory.sol: 275, 338, 408, 474, 498, 522, 544, 566, 589, 613, 638, 667, 695, 723, 752, 781, 808, 829, 854, 890, 912, 936, 960, 997, 1017, 1038, 1059, 1082, 1106, 1128, 1154, 1180, 1203	Pending

Description

To bridge the gap in trust between the administrators need to express a sincere attitude regarding the considerations of the administrator team's anonymity.

The `owner` of `IterativeVestingFarm` has the responsibility to notify users about the following capabilities:

- add users' rewards through `addUsersRewards()`
- remove user from farm through `removeUser()`
- pause the farm through `pauseFarm()`
- remove leftover rewards to the `collector` through `removeLeftOverRewards()`
- withdraw assets on the farm to the `collector` through `emergencyAssetsWithdrawal()`
- fund the farm and active through `fundAndOrActivate()`

The `owner` of `LinearVestingFarm` has the responsibility to notify users about the following capabilities:

- add users' rewards through `addUsersRewards()`
- remove user from farm through `removeUser()`
- pause the farm through `pauseFarm()`
- set the `endTime` through `setEndTime()`
- remove leftover rewards to the `collector` through `removeLeftOverRewards()`
- withdraw assets on the farm to the `collector` through `emergencyAssetsWithdrawal()`
- fund the farm and active through `fundAndOrActivate()`

Any compromise to the `owner` account may allow a hacker to take advantage of this authority.

The `maintainer` of `TokensFarmFactory` has the responsibility to notify users about the following capabilities:

- deploy and fund tokens farm through `deployAndFundTokensFarm()`
- deploy and fund linear vesting farm through `deployLinearVestingFarm()`

- deploy and fund iterative vesting farm through `deployIterativeVestingFarm()`
- fund again the tokens farm if necessary through `fundTheSpecificFarm()`
- fund again the linear vesting farm if necessary through `fundAndOrActivateSpecificLinearFarm()`
- fund again the iterative vesting farm if necessary through `fundAndOrActivateSpecificIterativeFarm()`
- pause the linear vesting farm through `pauseLinearSpecificFarm()`
- pause the iterative vesting farm through `pauseIterativeSpecificFarm()`
- add more users on linear vesting farm through `addMoreUsersOnSpecificLinearFarm()`
- add more users on iterative vesting farm through `addMoreUsersOnSpecificIterativeFarm()`
- set `minTimeToStake` in tokens farm through `setMinTimeToStakeOnSpecificFarm()`
- set `isEarlyWithdrawAllowed` in tokens farm through `setIsEarlyWithdrawAllowedOnSpecificFarm()`
- set `stakeFeePercent` in tokens farm through `setStakeFeePercentOnSpecificFarm()`
- set `rewardFeePercent` in tokens farm through `setRewardFeePercentOnSpecificFarm()`
- set `flatFeeAmount` in tokens farm through `setFlatFeeAmountOnSpecificFarm()`
- set `isFlatFeeAllowed` in tokens farm through `setIsFlatFeeAllowedOnSpecificFarm()`

Any compromise to the `maintainer` account may allow a hacker to take advantage of this authority.

The `tokensFarmCongress` of `TokensFarmFactory` has the responsibility to notify users about the following capabilities:

- remove users from the linear vesting farm through `removeUserOnSpecificLinearFarm()`
- remove users from the iterative vesting farm through `removeUserOnSpecificIterativeFarm()`
- withdraw the remaining funds left on the linear vesting farm through `withdrawLeftOverTokensOnSpecificLinearVestingFarm()`
- withdraw the remaining funds left on the iterative vesting farm through `withdrawLeftOverTokensOnSpecificIterativeVestingFarm()`
- withdraw assets on the linear vesting farm to the `feeCollector` through `emergencyAssetsWithdrawalOnSpecificLinearVestingFarm()`
- withdraw assets on the iterative vesting farm to the `feeCollector` through `emergencyAssetsWithdrawalOnSpecificIterativeVestingFarm()`
- withdraw fee collected in ERC value through `withdrawCollectedFeesERCOnSpecificFarm()`
- withdraw fee collected in ETH value through `withdrawCollectedFeesETHOnSpecificFarm()`
- withdraw stuck tokens on the farm through `withdrawTokensIfStuckOnSpecificFarm()`
- set `farmImplementation` through `setTokensFarmImplementation()`
- set `linearVestingFarmImplementation` through `setLinearVestingFarmImplementation()`
- set `iterativeVestingFarmImplementation` through `setIterativeVestingFarmImplementation()`

- set `farmImplementation`,`linearVestingFarmImplementation` and `iterativeVestingFarmImplementation` through `setAllImplementationAtOnce()`
- set `feeCollector` through `setFeeCollector()`
- set `feeCollector` in tokens farm through `setCurrentFeeCollectorOnSpecificFarm()`
- set `endTime` in linear vesting farm through `setEndTimeOnSpecificLinearVestingFarm()`
- set `proxyAdmin` through `setProxyAdmin()`

Any compromise to the `tokensFarmCongress` account may allow a hacker to take advantage of this authority.

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 advise the client to carefully manage 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 short-term, long-term and permanent:

Short Term:

Timelock and Multi sign (⅔, ⅗) combination *mitigate* by delaying the sensitive operation and avoiding a single point of key management failure.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key compromised;
  AND
- A medium/blog link for sharing the timelock contract and multi-signers addresses information with the public audience.

Long Term:

Timelock and DAO, the combination, *mitigate* by applying decentralization and transparency.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND

- Introduction of a DAO/governance/voting module to increase transparency and user involvement.

  AND
- A medium/blog link for sharing the timelock contract, 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.

CON-02 | Potential Front-Running Risk

Category	Severity	Location	Status
Volatile Code	Minor	contracts/IterativeVestingFarm.sol: 109 contracts/LinearVestingFarm.sol: 92 contracts/TokensFarmFactory.sol: 71	Pending

Description

Malicious hackers may observe the pending transaction which will execute the `initialize` function, and launch a similar transaction but with the hacker's address of `owner` and gain the ownership of the contract.

Recommendation

We advise the client to design functionality to only allow a specific user to execute the `initialize` function.

LVF-01 | Incorrect `totalWithdrawn`

Category	Severity	Location	Status
Logical Issue	Major	contracts/LinearVestingFarm.sol: 433	Pending

Description

The `totalLeftLockedForUser` is the total remaining locked rewards, `claimAmountFromLocked` is the extractable rewards obtained based on the percentage of `totalLeftLockedForUser` and has been accumulated to `amountEarned` in line 420. Then `totalWithdrawn` should be the sum of `amountEarned` and `burnAmount`.

Recommendation

We advise the client to recheck the logic.

TFF-01 | Centralized Control Of Contract Upgrade

Category	Severity	Location	Status
Centralization / Privilege	Major	contracts/TokensFarmFactory.sol: 275, 338, 408	Pending

Description

The contract is an upgradeable contract, the proxy admin can upgrade the contract without the community's commitment. If an attacker compromises the account, he can change the implementation of the contract and drain tokens from the contract.

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 advise the client to carefully manage 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., multisignature wallets.

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

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Long Term:

Timelock and DAO, the combination, *mitigate* by applying decentralization and transparency.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;

  AND
- Introduction of a DAO/governance/voting module to increase transparency and user involvement.

  AND
- A medium/blog link for sharing the timelock contract, 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.

Appendix

Finding Categories

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.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block.timestamp works.

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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