Leverage farming smart contracts by kord.fi

Tezos Foundation

Independent security assessment report

inference

Report version: 1.0 / date: 13.04.2023

inference

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Version / Date	Description
1.0 / 13.04.2023	Final version

Summary

Inference AG was engaged by the Tezos Foundation to perform an independent security assessment of kord.fi's leveraged farming smart contract.

Inference AG performed the security assessment based on the agreed scope, following our approach and activities as outlined in the "Project overview" chapter between 20th December 2022 and 3rd March 2023. Feedback from the kord.fi was received during the course of the assessment and Inference performed a follow-up assessment.

During our initial assessment, we identified a critical security issue and a few observations that could potentially enhance the quality of kord.fi's leveraged farming smart contract.

In light of our follow-up assessment, we are pleased to confirm that any reported security issues have been resolved. This report only shows remaining open or partly resolved security issues and observations.

Overview on issues and observations

Details for each reported issue or observation can be obtained from the "Security issues" and "Observations" sections.

Row header	Severity / Status
Security issues	
There are no open known security issues.	
Observations	
O-TFA-001: upfront_commission in tez farm	- / open
O-TFA-002: Documentation	- / open

Project overview

Scope

The scope of the security assessment were the leveraged farming smart contracts by kord.fi:

- Tez farm smart contract:
  src/LeveragedFarmLendingSmartContract.py
- BTC farm smart contract:
  src/BTCLeveragedFarmLendingSmartContract.py

Our initial assessment considered commit "b1a3fb0611a65e04cb963e6d4cd74e16a38e81c3" in the source code repository https://gitlab.com/l3544/levered-farming-contracts .

Our reassessment considered commit "69ef774289f9980d3790f0b8b139c1e867961c34" and the compiled smart contracts in Michelson on Mainnet:

- Tez farm smart contract:
  mainnet: KT19qWdPBRtkWrsQnDvVfsqJgJB19keBhhMX
- BTC farm smart contract:
  mainnet: KT1WL6sHt8syFT2ts7NCmb5gPcS2tyfRxSyi

In addition to the readme, we also had access to the following documentation in order to build up our understanding:
https://docs.kord.fi/

Scope limitations

Our security assessment is based on the following key assumptions and scope limitations:

- Any potential adversarial activities conducted by the administrator of the contract or operational errors by administrators were out of scope.
- Content of metadata and token metadata were out of scope. For instance, any off-chain views have not been assessed.
- The oracles are deemed as trusted sources by kord.fi. Thus, potential risks of a misbehaving price oracle were out of scope.
- The economic model, including the appropriate settings of thresholds, factors, etc. was out of scope.
- Smart contracts for the tokens used (Sirius & tzBTC) were regarded as trusted.

Methodology

Inference's methodology for smart contract security assessments on Tezos is a combination of a source code review of the smart contract source code in the high-level language (e.g. Ligo or SmartPy), and the resulting compiled code in Michelson. This approach provides additional assurance that the compiler producing the Michelson code is correct, and does not introduce any security issues. Furthermore, this approach fosters a better understanding for smart contract users of what has been reviewed and what has been effectively deployed on-chain.

In order to ensure a high quality in our security assessments, Inference is using subject matter experts having a high adversarial scenario mindset to spot potential issues in smart contracts under review. Additionally, we apply checklists derived from good practices and commonly known issues based on the Tezos smart contract assessment checklist to document our work and to ensure good issue coverage.

Furthermore, Inference maintains regular communications with the smart contract development team to ensure a correct understanding of the smart contract solution and environment, but also to make teams aware of any observations as soon as possible.

Inference's internal quality assurance procedures ensure that results of security assessments are challenged for completeness and appropriateness by a second independent expert.

Objectives

The objectives are the identification of security issues with regards to the assessed smart contracts and their conceptual design and specification. The security assessment also focuses on adversarial scenarios on specific use cases which have been listed in the appendix named Adversarial scenarios. These were identified together with the tzConnect's FA2 smart contract template developers and checked during our security assessment.

Activities

Our security assessment activities for the defined scope were:

- Source code review of smart contract code in SmartPy
- Source code review of the deployed smart contract in Michelson on ghostnet

We applied the checklist for smart contract security assessments on Tezos, version 1.2 obtained from https://github.com/InferenceAG/TezosSecurityAssessmentChecklist. We applied the following security checklist tables:

- System / Platform
- Storage
- Gas issues and efficiency
- Code issues
- Transaction
- Entrypoint
- Admin / Operator functions
- Other topics & test cases

Our activities for the follow-up assessment were:

- Source code review of changes in the smart contract code in SmartPy,
- Source code review of changes in the deployed smart contract in Michelson on mainnet, and
- Reassessing security issues and observations from the initial assessment if claimed to be resolved.

Security issues

There are no open known security issues.

Observations

O-TFA-001: upfront_commission in tez farm

The entrypoint “investBalancedLB” in the tez farm smart contract does not take into account the sent tez amount when calculating the “upfront_commission”. Users calling this entrypoint therefore pay a higher upfront commission should they choose to have a leverage ratio lower than 2.

Recommendation:
We recommend clearly documenting how the entrypoint works and the repercussions for users.

Comment from kord.fi:
We added an entrypoint investBalancedLB in our documentation with a proper description: https://docs.kord.fi/entrypoints.

Results from follow-up assessment:
No reassessment performed for this observation. Thus, status kept on “open”.

O-TFA-002: Documentation

There is a lack of documentation. Namely, the following aspects and facts are not sufficiently covered or missing in our view:

- Information on redeem entrypoints indicating that it is also possible to partially unwind.
- Entrypoint returnDepts is not documented.
- Information/warning that if liquidators are providing excessive assets, then the assets in excess are not returned to the liquidator.

Recommendation:
We recommend updating the documentation.

Comment from kord.fi:
All missing information was added to the documentation:

- Redeem - to entrypoints page: https://docs.kord.fi/entrypoints
- returnDebt - to entrypoint page and farm page as a feature description: https://docs.kord.fi/entrypoints and https://docs.kord.fi/farming
- Warning - to liquidation page https://docs.kord.fi/liquidation

Results from follow-up assessment:
No reassessment performed for this observation. Thus, status kept on “open”.

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In addition, the Report only addresses the issues of the system and software at the time the Report was produced. The Client should be aware that blockchain technology and cryptographic assets present a high level of ongoing risk. Given the fact that inherent limitations, errors or failures in any software development process and software product exist, it is possible that even major failures or malfunctions remain undetected by the Report. Inference did not assess the underlying third party infrastructure which adds further risks. Inference relied on the correct performance and execution of the included third party technology itself.

Appendix

Adversarial scenarios

The following adversarial scenarios have been identified together with kord.fi's leveraged farming smart contract developers and checked during our security assessment.

Scenario	Impact rating & descriptive	Assessment result
Extraction of assets in custody of the kord.fi farms. E.g. by: - Extracting more assets than deposited and properly gained. - Extracting more assets than invested and properly gained.	High: Loss of assets in custody of the farm.	**Ok** Nothing identified.
Flash loan attacks in order to push SiriusDEX out of its assets equilibrium leading to potential profitable deals on kord.fi leverage farms.	High: Loss of assets in custody of the farm.	**Ok** Nothing identified.

Risk rating definition for smart contracts

Severities are quantified with two dimensions, roughly defined as follows, whereas the examples have to be regarded as indication only:

Probability of occurrence / materialisation of an issue
(bullets for a category are linked with each other with “and/or” condition.)

- Low:
  - A trusted / privileged role is required.
  - Contract may end up in the issue if other conditions, which are also unlikely to happen, are required.
- Medium:
  - A specific role or contract state is required to trigger the issue.
  - Contract may end up in the issue if another condition is fulfilled as well.
- High:
  - Anybody can trigger the issue.
  - Contract’s state will over the short or long term end up in the issue.

Impact:
(bullets for a category are linked with each other with “and/or” condition.)

- Low:
  - Non-compliance with TZIP standards
  - Unclear error messages
  - Confusing structures
- Medium:
  - A minor amount of assets can be withdrawn or destroyed.
- High:
  - Not inline with the specification
  - A non-minor amount of assets can be withdrawn or destroyed.
  - Entire or part of the contract becomes unusable.

Severity:

	Low impact	Medium impact	High impact
High probability	**High**	**Critical**	**Critical**
Medium probability	**Medium**	**High**	**Critical**
Low probability	**Low**	**Medium**	**High**

Glossary

Term	Description
Archetype	High level smart contract language. Website: https://archetype-lang.org/
Ligo	High level smart contract language. Website: https://ligolang.org/
Origination	Deployment of a smart contract
SmartPy	High level smart contract language. Website: https://smartpy.io/
TZIP	Tezos Improvement Proposal