Maker DAO - SNST

Security Review

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1 Introduction

1.1 About Cantina

Cantina is a security services marketplace that connects top security researchers and solutions with clients. Learn more at cantina.xyz

1.2 Disclaimer

Cantina Managed provides a detailed evaluation of the security posture of the code at a particular moment based on the information available at the time of the review. While Cantina Managed endeavors to identify and disclose all potential security issues, it cannot guarantee that every vulnerability will be detected or that the code will be entirely secure against all possible attacks. The assessment is conducted based on the specific commit and version of the code provided. Any subsequent modifications to the code may introduce new vulnerabilities that were absent during the initial review. Therefore, any changes made to the code require a new security review to ensure that the code remains secure. Please be advised that the Cantina Managed security review is not a replacement for continuous security measures such as penetration testing, vulnerability scanning, and regular code reviews.

1.3 Risk assessment

Severity	Description
Critical	*Must* fix as soon as possible (if already deployed).
High	Leads to a loss of a significant portion (>10%) of assets in the protocol, or significant harm to a majority of users.
Medium	Global losses <10% or losses to only a subset of users, but still unacceptable.
Low	Losses will be annoying but bearable. Applies to things like griefing attacks that can be easily repaired or even gas inefficiencies.
Gas Optimization	Suggestions around gas saving practices.
Informational	Suggestions around best practices or readability.

1.3.1 Severity Classification

The severity of security issues found during the security review is categorized based on the above table. Critical findings have a high likelihood of being exploited and must be addressed immediately. High findings are almost certain to occur, easy to perform, or not easy but highly incentivized thus must be fixed as soon as possible.

Medium findings are conditionally possible or incentivized but are still relatively likely to occur and should be addressed. Low findings a rare combination of circumstances to exploit, or offer little to no incentive to exploit but are recommended to be addressed.

Lastly, some findings might represent objective improvements that should be addressed but do not impact the project's overall security (Gas and Informational findings).

2 Security Review Summary

The Maker Protocol, also known as the Multi-Collateral Dai (MCD) system, allows users to generate Dai (a decentralized, unbiased, collateral-backed cryptocurrency soft-pegged to the US Dollar) by leveraging collateral assets approved by the Maker Governance, which is the community organized and operated process of managing the various aspects of the Maker Protocol.

From Jun 17th to Jun 21st the Cantina team conducted a review of sdai/tree/snst on commit hash 47bfad40.

The Cantina team reviewed MakerDao's SNST changes holistically on commit hash 3d0a270536d1adab591a1b38be8018040fbb50b2 and determined that all issues were resolved and no new issues were identified.

The team identified a total of **3** issues in the following risk categories:

- Critical Risk: 0
- High Risk: 0
- Medium Risk: 0
- Low Risk: 1
- Gas Optimizations: 0
- Informational: 2

3 Findings

3.1 Low Risk

3.1.1 Setting new `NSR` breaks reliability of extrapolating view functions

Severity: Low Risk

Context: SNst.sol#L202-L204

Description: Setting a new savings rate via `SNst.file("nsr", *)` does not update the interest accumulator to the current time with the old savings rate. Therefore, view functions that extrapolate the accrued interest with the current savings rate can be inaccurate and the assumed interest can even decrease again in the future when setting a lower `nsr`. This can lead to issues with integrations that often rely on invariants such as the accumulator value, and by extension functions like `convertToAssets`, `previewRedeem` and `maxWithdraw`, never decreasing over time.

Recommendation: Consider `drip`ping in `file` or checking that `drip` has already been called this block by requiring `rho == block.timestamp`.

Maker: Was changed in commit 3d0a2705.

Cantina Managed: Fixed. The `require(rho == block.timestamp, "SNst/chi-not-up-to-date");` check has been added.

3.2 Informational

3.2.1 `sNst` accumulates DAI dust

Severity: Informational

Context: SNst.sol#L401

Description: The `sNst` uses a fixed share price `chi` for minting and redeeming shares (compared to a dynamic one taking into account the total DAI assets / total shares). It also rounds in favor of the contract, against the user, when depositing and withdrawing assets. Therefore, a small DAI balance will accumulate in the contract as users interact with the contract. These assets are locked in the contract and cannot be withdrawn.

Recommendation: As the dust value is tiny (in order of number of contract withdrawals) compared to DAI's 18-decimal precision, the excess locked value is negligible. No further action needs to be taken.

Maker: Acknowledged.

Cantina Managed: Acknowledged.

3.2.2 Missing parent initializer call in `SNst`

Severity: Informational

Context: SNst.sol#L111-L116

Description: Upgradeable contracts require replacing the constructor with an initializer function for the implementation contract. The initialize function should call the initialize functions of the inherited parent contracts.

> "Constructors are replaced by internal initializer functions following the naming convention `__{ContractName}_init`. Since these are internal, you must always define your own public initializer function and call the parent initializer of the contract you extend." OZ docs

Recommendation: While the `__UUPSUpgradeable_init` initialization function is a no-op in the used OZ dependency version, consider calling it in `initialize` as a best practice.

Maker: Was changed in commit 3d0a2705.

Cantina Managed: Fixed.