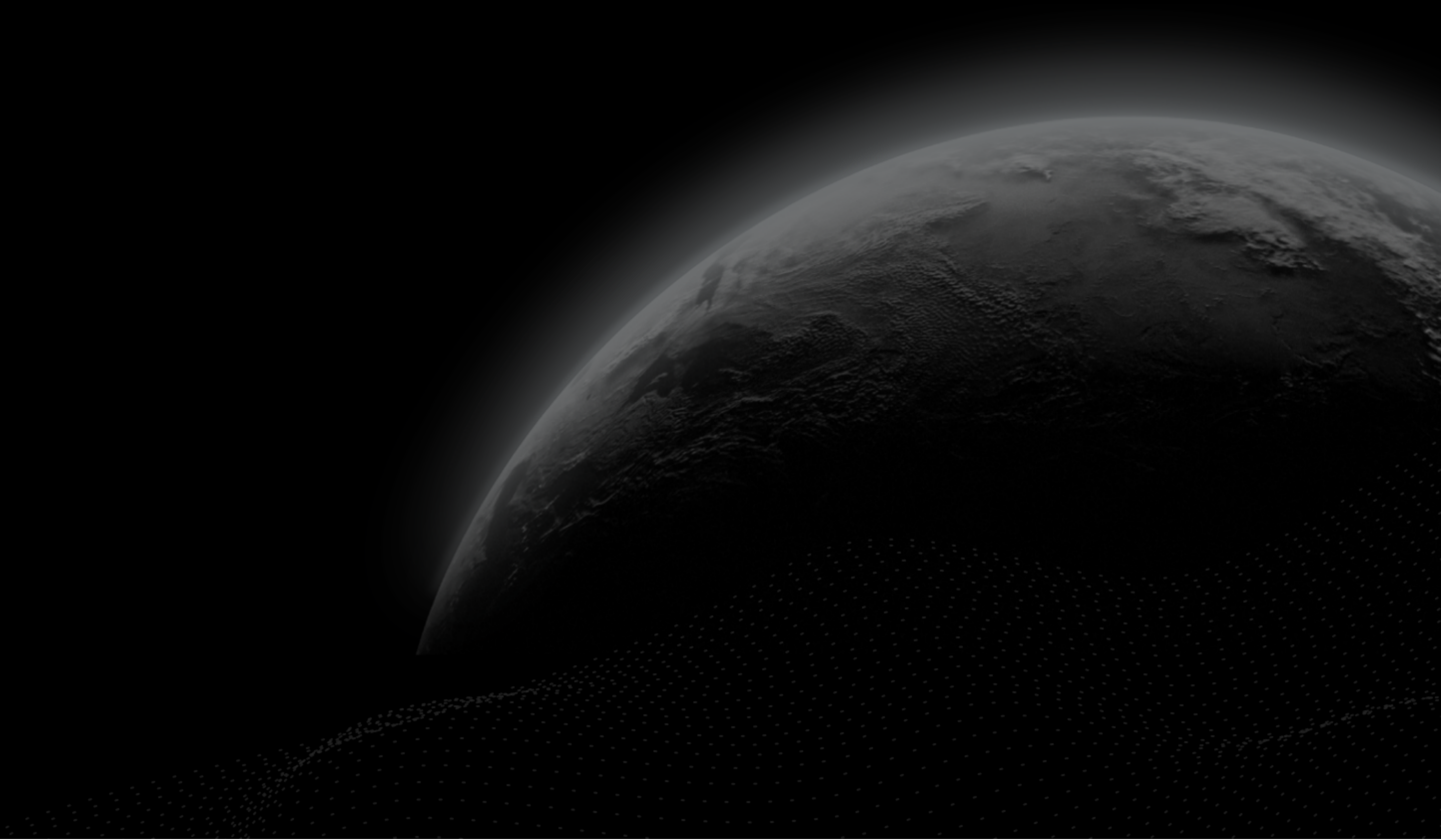
CERTIK

Security Assessment

Venus - Risk Fund Upgrade

CertiK Assessed on Aug 26th, 2024



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Venus - Risk Fund Upgrade

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

Executive Summary

TYPES	ECOSYSTEM	METHODS
DeFi	Binance Smart Chain (BSC)	Manual Review, Static Analysis

LANGUAGE	TIMELINE	KEY COMPONENTS
Solidity	Delivered on 08/26/2024	N/A

CODEBASE

https://github.com/VenusProtocol/protocol-reserve

View All in Codebase Page

COMMITS

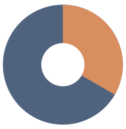
Base: 102adf44d9e6b1107af9eeeed0fbcf25acd11680

Update1: c49b381e42a0d6fce2686b4083abb5a7716e0561

Update2: 285b27ee2ba0bac2fb34b87a74852532376a7814

View All in Codebase Page

Vulnerability Summary



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

🟥 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 Acknowledged	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.
🟨 0	Minor		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.
🟦 2	Informational	2 Resolved	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 | VENUS - RISK FUND UPGRADE

Repository

https://github.com/VenusProtocol/protocol-reserve

Commit

Base: 102adf44d9e6b1107af9eeeed0fbcf25acd11680

Update1: c49b381e42a0d6fce2686b4083abb5a7716e0561

Update2: 285b27ee2ba0bac2fb34b87a74852532376a7814

AUDIT SCOPE | VENUS - RISK FUND UPGRADE

1 file audited ● 1 file without findings

ID	Repo	File	SHA256 Checksum
● RFP	VenusProtocol/protocol-reserve	RiskFundV2.sol	ec1eea8a7e80bfd8a79d0fb9a761f4ae19b8b1468c8ce0d1e661ea5f1338e3b4

APPROACH & METHODS | VENUS - RISK FUND UPGRADE

This report has been prepared for Venus to discover issues and vulnerabilities in the source code of the Venus - Risk Fund Upgrade 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.

SUMMARY | VENUS - RISK FUND UPGRADE

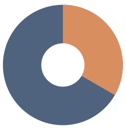
This audit concerns the changes made in the in scope files in following PR:

- https://github.com/VenusProtocol/protocol-reserve/pull/100

Note that any centralization risks present in the existing codebase before this PR were not considered in this audit. We recommend all users to carefully review the centralization risks, much of which can be found in our previous audits which can be found here: https://skynet.certik.com/projects/venus.

In particular, this PR is designed to upgrade the current implementation of the RiskFund contract. The upgrade makes changes to the `sweepTokenFromPool()` , which originally allowed the owner to sweep funds from the reserves of the input pool to the pool's comptroller. The upgrade adds an input `receiver` , which can be set to any nonzero address, and sweeps the tokens to this address, instead of always sending them to the `comptroller` . In addition, its access is changed to being controlled by the `AccessControlManager` , as opposed to only being able to being called by the owner, which is currently the Normal Timelock. These changes can allow multiple entities to call this contract. For example, it can be used to allow the Normal, Fast-Track, and Critical Timelocks to have access to the function in order to execute the function within shorter timeframes. In addition, it allows for custom flows when covering debts by allowing the tokens to be transferred to an address other than the comptroller.

FINDINGS | VENUS - RISK FUND UPGRADE



3	0	1	0	0	2
Total Findings	Critical	Major	Medium	Minor	Informational

This report has been prepared to discover issues and vulnerabilities for Venus - Risk Fund Upgrade. 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
RFP-01	**Centralization Risks In RiskFundV2.Sol**	**Centralization**	**Major**	● **Acknowledged**
RFP-02	Typos And Inconsistencies	Inconsistency	Informational	● Resolved
RFP-03	Emitted Event Does Not Specify Receiver	Inconsistency	Informational	● Resolved

RFP-01 | CENTRALIZATION RISKS IN RISKFUNDV2.SOL

Category	Severity	Location	Status
Centralization	● **Major**	**RiskFundV2.sol (Base): 162~163**	● **Acknowledged**

Description

Note that any centralization risks present in the existing codebase before the PR's in scope of this audit were not considered. Only those added to the in-scope PRs are addressed. We recommend all users carefully review the centralization risks, much of which can be found in our previous audits, which can be found here: https://skynet.certik.com/projects/venus.

In the contract `RiskFundV2` the `DEFAULT_ADMIN_ROLE` of the `AccessControlManager` can grant addresses the privilege to call the function `sweepTokenFromPool()` .

Any compromise to the `DEFAULT_ADMIN_ROLE` or accounts granted this privilege may allow the hacker to take advantage of this authority and remove any amount of any token from the contract, sending it to an address they control.

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:

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.

Alleviation

`[Venus, 08/22/2024]` : We'll use the AccessControlManager (ACM) deployed at 0x4788629abc6cfca10f9f969efdeaa1cf70c23555.

In this ACM, only `0x939bd8d64c0a9583a7dcea9933f7b21697ab6396` (Normal Timelock) has the `DEFAULT_ADMIN_ROLE` . And this contract is a Timelock contract used during the Venus Improvement Proposals.

We'll allow Normal, Fast-track and Critical timelock contracts to execute the function `sweepTokenFromPool()` .

`[CertiK, 08/23/2024]` : These steps would meet our standards for *Mitigated* status. However, until these operations are completed and the setup can be verified we leave this finding as *Acknowledged*.

RFP-02 | TYPOS AND INCONSISTENCIES

Category	Severity	Location	Status
Inconsistency	● Informational	RiskFundV2.sol (Base): 152~153, 153	● Resolved

Description

- The comments above the function `sweepTokenFromPool()` use "sweepTokenFromPool" for the documented event as opposed to "SweepTokenFromPool".
- The comments above the function `sweepTokenFromPool()` state "ZeroAddressNotAllowed is thrown when tokenAddress/comptroller address is zero". However, it is now also thrown when `receiver` address is zero.

Recommendation

We recommend fixing the typos and inconsistencies mentioned above.

Alleviation

`[CertiK, 08/23/2024]` : The client made the recommended changes in commit c49b381e42a0d6fce2686b4083abb5a7716e0561.

RFP-03 | EMITTED EVENT DOES NOT SPECIFY RECEIVER

Category	Severity	Location	Status
Inconsistency	● Informational	RiskFundV2.sol (Base): 180	● Resolved

Description

The `SweepTokenFromPool` event does not specify the `receiver`. This is inconsistent with the `SweepToken` event which does specify the `to` address.

Recommendation

We recommend adding a parameter for the `receiver` in the `SweepTokenFromPool` for consistency and to improve tracing.

Alleviation

`[CertiK, 08/23/2024]`: The client made the recommended changes in commit c49b381e42a0d6fce2686b4083abb5a7716e0561.

APPENDIX | VENUS - RISK FUND UPGRADE

Finding Categories

Categories	Description
Inconsistency	Inconsistency findings refer to different parts of code that are not consistent or code that does not behave according to its specification.
Centralization	Centralization findings detail the design choices of designating privileged roles or other centralized controls over the code.

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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