CERTIK

Security Assessment

WOOFi - IV

CertiK Verified on Oct 12th, 2022

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WOOFi - IV

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

Executive Summary

TYPES	ECOSYSTEM	METHODS
DeFi	BSC	Manual Review, Static Analysis

LANGUAGE	TIMELINE	KEY COMPONENTS
Solidity	Delivered on 10/12/2022	N/A

CODEBASE
https://github.com/woonetwork/WooPoolV2
...View All

COMMITS
e18b68ae511a7285face1e20cf342be9e859caaa
...View All

Vulnerability Summary

5	4	0	0	1	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 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.

4	Minor	4 Resolved	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.
0	Informational		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 | WOOFI - IV

Repository

https://github.com/woonetwork/WooPoolV2

Commit

e18b68ae511a7285face1e20cf342be9e859caaa

AUDIT SCOPE | WOOFI - IV

2 files audited ● 2 files with Resolved findings

ID	File	SHA256 Checksum
● WPP	contracts/WooPPV2.sol	bb19d0304f272650f13f980b70cf2ad07b46f881077ff2959cd1d720b2fde3c7
● WVW	contracts/WooracleV2.sol	8313175f071495733b2bb78dde533668856b6a32f11917ef2021eb5407b6769d

APPROACH & METHODS | WOOFI - IV

This report has been prepared for WOOFi - IV to discover issues and vulnerabilities in the source code of the WOOFi - IV 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 | WOOFI - IV

5	0	1	0	4	0
Total Findings	Critical	Major	Medium	Minor	Informational

This report has been prepared to discover issues and vulnerabilities for WOOFi - IV. Through this audit, we have uncovered 5 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:

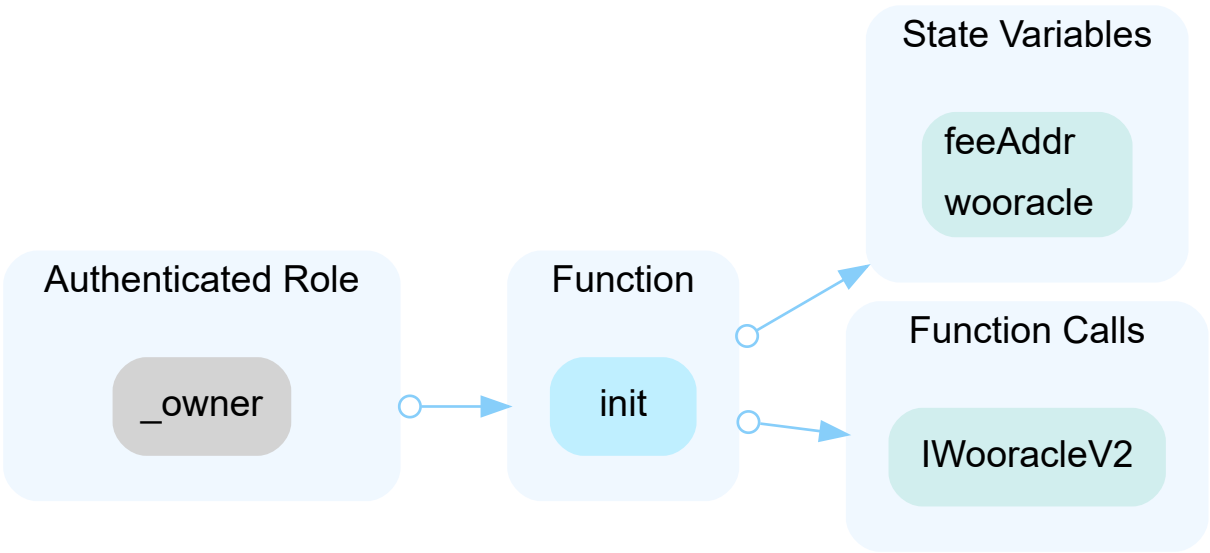
ID	Title	Category	Severity	Status
GLOBAL-01	**Centralization Related Risks**	**Centralization / Privilege**	**Major**	**Acknowledged**
WPP-01	Check Effect Interaction Pattern Violated	Logical Issue	Minor	Resolved
WPV-01	Third Party Dependency	Volatile Code	Minor	Resolved
WPV-02	Missing Zero Address Validation	Volatile Code	Minor	Resolved
WVW-01	Hardcoded Decimal	Logical Issue	Minor	Resolved

GLOBAL-01 | CENTRALIZATION RELATED RISKS

Category	Severity	Location	Status
Centralization / Privilege	**Major**		**Acknowledged**

Description

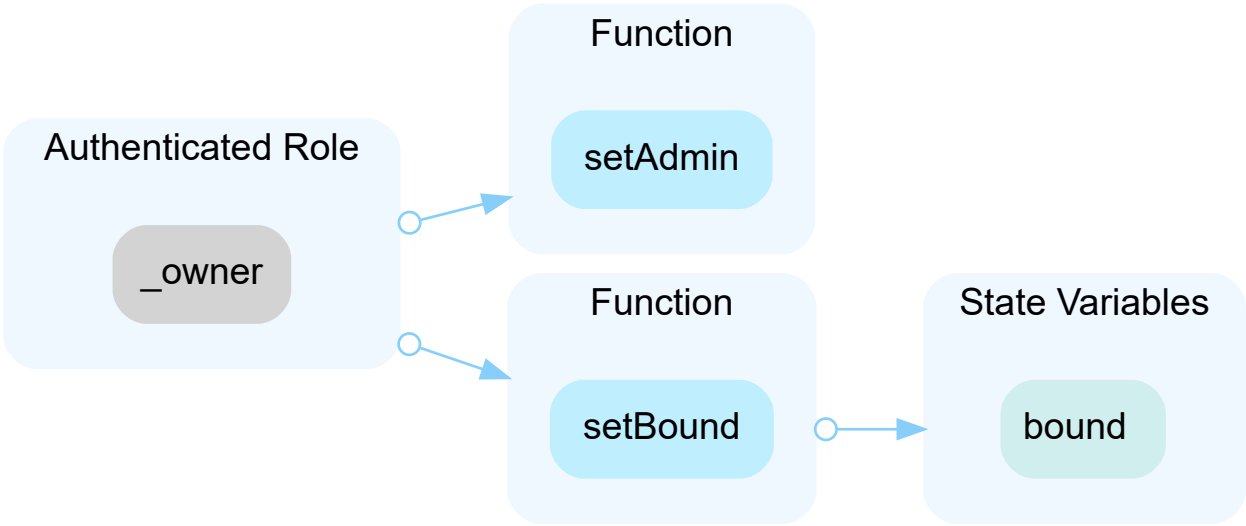
In the contract `WooPPV2` the role `_owner` has authority over the functions shown in the diagram below.



Moreover, the role `admin` has authority over the functions shown in the below.

- `setQuoteToken()`
- `setFeeAddr()`
- `claimFee()`
- `setFeeRate()`
- `pause()`
- `unpause()`
- `setAdmin()`
- `deposit()`
- `withdraw()`
- `withdrawAll()`

In the contract `WooracleV2` the role `_owner` has authority over the functions shown in the diagram below.



Moreover, the role `admin` has authority over the functions shown in the below.

- `setWooracle()`
- `setCLOracle()`
- `setStaleDuration()`
- `postPrice()`
- `postPriceList()`
- `postSpread()`
- `postSpreadList()`
- `postState()`
- `postStateList()`

Any compromise to the privileged account may allow the hacker to take advantage of this authority and update the sensitive settings and execute sensitive functions of the project

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

`[WOOFI]`: Will be the same process as the previous woopp version 1, with 3/5 multisig. Our Swap pool only contains our own fund, too.

WPP-01 | CHECK EFFECT INTERACTION PATTERN VIOLATED

Category	Severity	Location	Status
Logical Issue	Minor	contracts/WooPPV2.sol: 164, 226~228, 230, 260~261, 283, 294	Resolved

Description

The order of external call/transfer and storage manipulation must follow the check-effect-interaction pattern in the function `sellBase()`, `sellQuote()`, `claimFee()`, `deposit()` and `withdraw()`

For example, in function `sellQuote()`:

```
226 if (to != address(this)) {
227     TransferHelper.safeTransfer(baseToken, to, baseAmount);
228 }
229
230 _updateReserve(baseToken);
```

Recommendation

We recommend using the Checks-Effects-Interactions Pattern to avoid the risk of calling unknown contracts or applying OpenZeppelin ReentrancyGuard library - `nonReentrant` modifier for the aforementioned functions to prevent reentrancy attack.

Alleviation

`[CertiK]`: The team heeded the advice and resolved the finding in the commit c19e24c40ab88328967560a6699cd92bc136811d

WPV-01 | THIRD PARTY DEPENDENCY

Category	Severity	Location	Status
Volatile Code	Minor	contracts/WooPPV2.sol: 80; contracts/WooracleV2.sol: 64, 92, 105	Resolved

Description

The contract is serving as the underlying entity to interact with one or more third party protocols. The scope of the audit treats third party entities as black boxes and assume their functional correctness. However, in the real world, third parties can be compromised and this may lead to lost or stolen assets. In addition, upgrades of third parties can possibly create severe impacts, such as increasing fees of third parties, migrating to new LP pools, etc.

```
80      IWooracleV2 public wooracle;
```

- The contract `WooPPV2` interacts with third party contract with `IWooracleV2` interface via `wooracle`.

```
64      mapping(address => CLOracle) public clOracles;
```

- The contract `WooracleV2` interacts with third party contract with `AggregatorV3Interface` interface via `clOracles`.

```
92      function setQuoteToken(address _quote, address _oracle) external onlyAdmin {
```

- The function `WooracleV2.setQuoteToken` interacts with third party contract with `AggregatorV3Interface` interface via `_oracle`.

```
105         address _oracle,
```

- The function `WooracleV2.setCLOracle` interacts with third party contract with `AggregatorV3Interface` interface via `_oracle`.

Recommendation

We understand that the business logic requires interaction with the third parties. We encourage the team to constantly monitor the statuses of third parties to mitigate the side effects when unexpected activities are

observed.

Alleviation

`[WOOFI]`: Wooracle V2 is audited ; chainlink code is also audited. Will monitor the security alert for chainlink too.

WPV-02 | MISSING ZERO ADDRESS VALIDATION

Category	Severity	Location	Status
Volatile Code	Minor	contracts/WooPPV2.sol: 92, 98, 252; contracts/WooracleV2.sol: 93	Resolved

Description

Addresses should be checked before assignment or external call to make sure they are not zero addresses.

```
92          quoteToken = _quoteToken;
```

- `_quoteToken` is not zero-checked before being used.

```
98          feeAddr = _feeAddr;
```

- `_feeAddr` is not zero-checked before being used.

```
252         feeAddr = _feeAddr;
```

- `_feeAddr` is not zero-checked before being used.

```
93          quoteToken = _quote;
```

- `_quote` is not zero-checked before being used.

Recommendation

We advise adding a zero-check for the passed-in address value to prevent unexpected errors.

Alleviation

`[WOOFI]`: Those methods are privileged as “onlyOwner”, we won’t set zero address to them, and zero address won’t stuck the contract too.

WVW-01 | HARDCODED DECIMAL

Category	Severity	Location	Status
Logical Issue	Minor	contracts/WooracleV2.sol: 239~242	Resolved

Description

The function `decimals()` in the contract `WooracleV2` hard coded the decimal of the `clOracles[base].decimal` token to 0 or 8. However, the `clOracles[base].decimal` token is uncertain and can be changed. Thus, the actual decimal of the `clOracles[base].decimal token maybe not be 0 or 8.

Recommendation

We would like to confirm with the client if the current implementation aligns with the original project design. We recommend ensuring the correctness of the decimals.

Alleviation

`[CertiK]`: This is an intentional design confirmed by the client.

APPENDIX | WOOFI - IV

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.
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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