



Preliminary Comments

RETH

Apr 12th, 2022

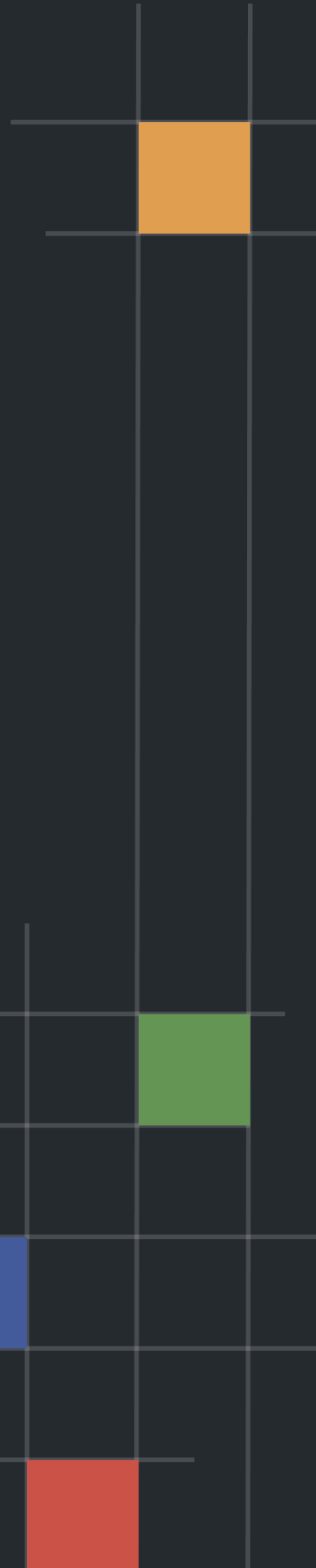


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Disclaimer

About

Summary

This report has been prepared for Decentralisedinvestment to discover issues and vulnerabilities in the source code of the RETH 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	RETH
Description	ERC20
Platform	Polygon
Language	Solidity
Codebase	https://polygonscan.com/address/0x614Af88dAc8bbFfC5a167BB79Ff3F5e0769F1A3F
Commit	

Audit Summary

Delivery Date	Apr 12, 2022 UTC
Audit Methodology	Static Analysis, Manual Review

Vulnerability Summary

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



Audit Scope

ID	File	SHA256 Checksum
ROE	RealmsOfEthernity.sol	37621f73facfcd356eb5db78475eeb9c52fa886a3e9b2889cdb9f9d6438e1649

Findings



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

ID	Title	Category	Severity	Status
ROE-01	Centralization Related Risks	Centralization / Privilege	Major	⚠ Pending
ROE-02	Different Solidity Versions	Language Specific	Informational	⚠ Pending
ROE-03	Unlocked Compiler Version	Language Specific	Informational	⚠ Pending
ROE-04	Missing Emit Events	Coding Style	Informational	⚠ Pending

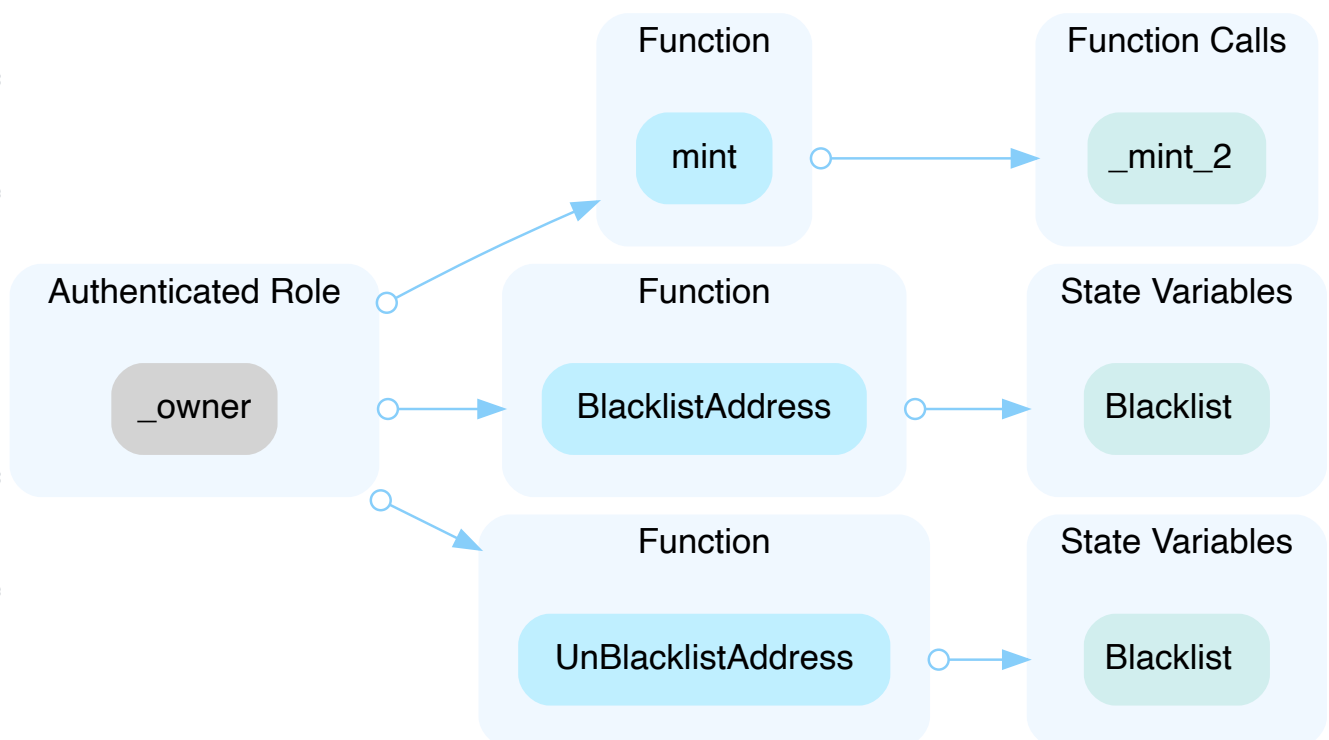
ROE-01 | Centralization Related Risks

Category	Severity	Location	Status
Centralization / Privilege	● Major	RealmsOfEternity.sol: 633, 645, 649	ⓘ Pending

Description

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

Any compromise to the `_owner` account may allow the hacker to take advantage of this authority and change the blacklist status of sensitive addresses.



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 ($\frac{2}{3}$, $\frac{3}{5}$) 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.

ROE-02 | Different Solidity Versions

Category	Severity	Location	Status
Language Specific	● Informational	RealmsOfEternity.sol: 6, 33, 111, 196, 226, 609	ⓘ Pending

Description

Multiple Solidity versions are used in the codebase.

Versions used: `^0.8.0`, `^0.8.4`

Recommendation

We recommend using one Solidity version.

ROE-03 | Unlocked Compiler Version

Category	Severity	Location	Status
Language Specific	● Informational	RealmsOfEthernity.sol: 6	⚠ Pending

Description

The contract has unlocked compiler version. An unlocked compiler version in the source code of the contract permits the user to compile it at or above a particular version. This, in turn, leads to differences in the generated bytecode between compilations due to different compiler versions. This can lead to an ambiguity when debugging as compiler specific bugs may occur in the codebase that would be hard to identify over a span of multiple compiler versions rather than a specific one.

Recommendation

We advise that the compiler version is instead locked at the lowest version possible that the contract can be compiled at. For example, for version `v0.6.2` the contract should contain the following line:

```
pragma solidity 0.6.2;
```

ROE-04 | Missing Emit Events

Category	Severity	Location	Status
Coding Style	● Informational	RealmsOfEternity.sol: 645, 649	ⓘ Pending

Description

There should always be events emitted in the sensitive functions that are controlled by centralization roles.

Recommendation

It is recommended emitting events for the sensitive functions that are controlled by centralization roles.

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.

Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of private or delete.

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

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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