



Smart Contract Security Audit Report

REN

June 2022

Security Status



www.hacksafe.io



Audit Details



Audited project

REN



Deployer address

0x9B1B265e548283430e6Ae4721842c448F4bed559



Client contacts

Ren team



Blockchain

Ethereum



Website

<https://renproject.io/>

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security. No product code has been reviewed.

Procedure

Step 1 - In-Depth Manual Review

Manual line-by-line code reviews to ensure the logic behind each function is sound and safe from various attack vectors. This is the most important and lengthy portion of the audit process (as automated tools often cannot find the nuances that lead to exploits such as flash loan attacks).

Step 2 - Automated Testing

Simulation of a variety of interactions with your Smart Contract on a test blockchain leveraging a combination of automated test tools and manual testing to determine if any security vulnerabilities exist.

Step 3 – Leadership Review

The engineers assigned to the audit will schedule meetings with our leadership team to review the contracts, any comments or findings, and ask questions to further apply adversarial thinking to discuss less common attack vectors.

Step 4 - Resolution of Issues

Consulting with the team to provide our recommendations to ensure the code's security and optimize its gas efficiency, if possible. We assist project team's in resolving any outstanding issues or implementing our recommendations.

Step 5 - Published Audit Report

Boiling down results and findings into an easy-to-read report tailored to the project. Our audit reports highlight resolved issues and any risks that exist to the project or its users, along with any remaining suggested remediation measures. Diagrams are included at the end of each report to help users understand the interactions which occur within the project.

Background

HackSafe was commissioned by Ren token to perform an audit of smart contracts:

- <https://etherscan.io/address/0x408e41876cccdc0f92210600ef50372656052a38#code>

The purpose of the audit was to achieve the

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be understood to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Contract Details

Token contract details for 22.06.2022

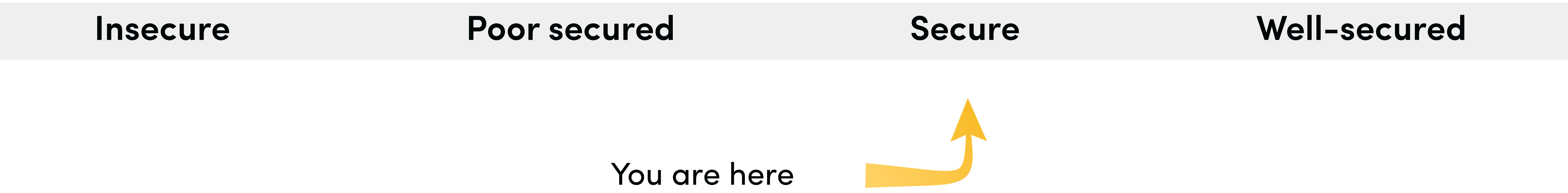
Token Type	: ERC20
Contract name	: RepublicToken
Contract address	: 0x408e41876cCCDC0F92210600ef50372656052a38
Compiler version	: v0.4.19+commit.c4cbbb05
Max Total supply	: 999,999,632
Token Ticker	: REN
Decimals	: 18
Token Holders	: 60,620
Top 100 token holder's dominance	: 81.86%
Transactions count	: 1,002,258
Contract deployer address	: 0x9B1B265e548283430e6Ae4721842c448F4bed559
Owner address	: 0x0001

Social profiles

Twitter Profile	: https://twitter.com/renprotocol
Facebook Profile	: https://www.facebook.com/RenProject/
Github Profile	: https://github.com/renproject
Telegram Profile	: https://t.me/renproject
LinkedIN Profile	: https://www.linkedin.com/company/republic-protocol/about/
Medium Profile	: https://medium.com/renproject
Coinmarketcap profile	: https://coinmarketcap.com/currencies/ren/
Coingecko profile	: https://www.coingecko.com/en/coins/ren
Uniswap profile	: https://v2.info.uniswap.org/pair/0x8bd1661da98ebdd3bd080f0be4e6d9be8ce9858c/
Reddit profile	: https://www.reddit.com/r/RenProject

Audit Summary

According to the standard audit assessment, Customer`s solidity smart contracts are “Secure”. This token contract does contain owner control, which do not make it fully decentralized as owner does have control over smart contract.



We used various tools like Slither, Mythril and Remix IDE. At the same time this finding is based on critical analysis of the manual audit. All issues found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the issues checking status.

We found 0 critical, 0 high, 0 medium and 2 low and some very low-level issues. These issues are not critical ones.

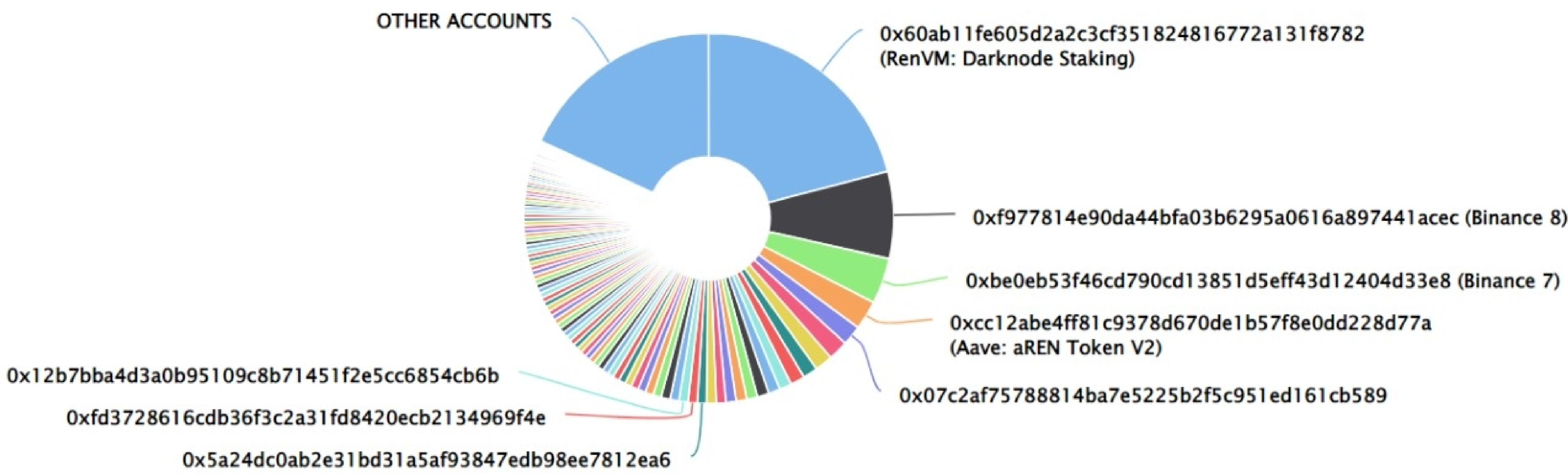
REN Distribution

💡 The top 100 holders collectively own 81.85% (818,529,667.92 Tokens) of Republic





💡 Token Total Supply: 999,999,632.80 Token | Total Token Holders: 60,619

Republic Top 100 Token Holders

Source: Etherscan.io

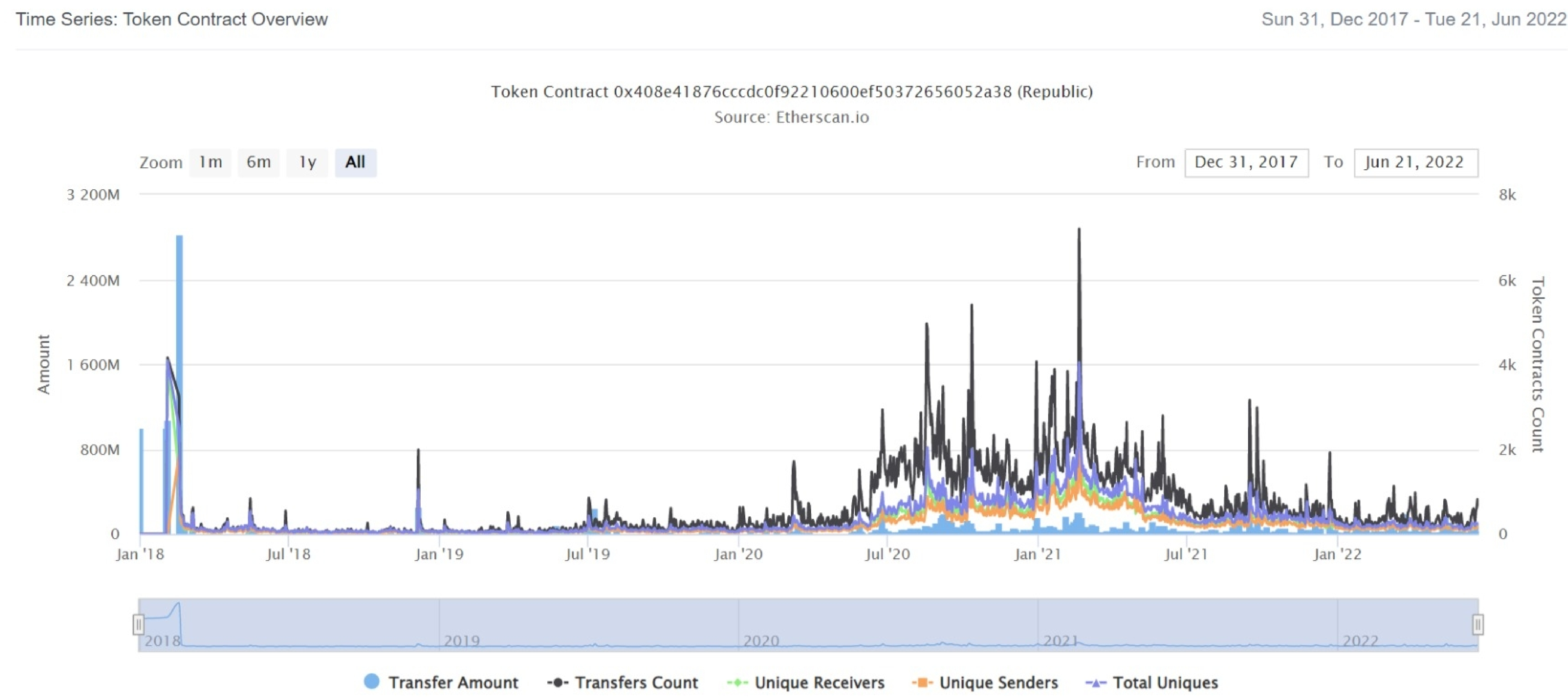


REN Top 20 Token Holders

Rank	Address	Quantity (Token)	Percentage
1	 RenVM: Darknode Staking	209,200,000	20.9200%
2	Binance 8	75,900,810	7.5901%
3	Binance 7	40,000,000	4.0000%
4	 Aave: aREN Token V2	25,485,132.532878977796560066	2.5485%
5	0x07c2af75788814ba7e5225b2f5c951ed161cb589	17,528,411.232944545389652818	1.7528%
6	 Gemini 6	17,390,001	1.7390%
7	0x30e84f627ebc336eee72cd720a837e6f75d865d5	15,710,764.332216716079151382	1.5711%
8	OKEx	12,900,202.43918020207505998	1.2900%
9	Coinbase 5	12,551,646.409436151450282515	1.2552%
10	0xb6d8ad36878bbb358cd46d1d7360b079f52ee015	10,658,889.4207914534875792	1.0659%
11	0x8e92039a1ab31a33b62c0af6d301780d1c363d76	10,150,372.686250276714460866	1.0150%
12	0x5a52e96bacdabb82fd05763e25335261b270efcb	10,000,000	1.0000%
13	 Gemini 4	9,633,821.639259432538259202	0.9634%
14	0xc2be79cf419cf48f447320d5d16f5115bbb58b03	9,278,393.839896442264054742	0.9278%
15	KuCoin 6	8,805,999	0.8806%
16	0xca2a63daf2df1fc72c12acf356afce244d582c55	8,523,746.8620850703294883	0.8524%
17	0x5770815b0c2a09a43c9e5aecb7e2f3886075b605	8,311,537.584245044816917036	0.8312%
18	0x5a24dc0ab2e31bd31a5af93847edb98ee7812ea6	8,000,000	0.8000%
19	0xfd3728616cdb36f3c2a31fd8420ecb2134969f4e	8,000,000	0.8000%
20	0x12b7bba4d3a0b95109c8b71451f2e5cc6854cb6b	7,872,451.381731728393390382	0.7872%

REN Distribution

REN Contract Overview



Contract functions details

+ [Lib] SafeMath

- [Int] mul
- [Int] div
- [Int] sub
- [Int] add

+Ownable (Context)

- [Pub] Ownable
- [Pub] transferOwnership #
- modifiers: onlyOwner

+ Pausable (Ownable)

- [Pub] pause
- modifiers: onlyOwner, whenNotPaused
- [Pub] unpause
- modifiers: onlyOwner whenPaused

+ ERC20Basic

- [Pub] balanceOf
- [Pub] transfer

+ BasicToken (ERC20Basic)

- [Pub] transfer #
- [Pub] balanceOf

+ ERC20 (ERC20Basic)

- [Pub] allowance
- [Pub] transferFrom
- [Pub] approve

+ StandardToken (ERC20, BasicToken)

- [Pub] transferFrom #
- [Pub] approve #
- [Pub] allowance
- [Pub] increaseApproval
- [Pub] decreaseApproval

+ BurnableToken (StandardToken)

- [Pub] burn #

Contract functions details

+PausableToken (StandardToken, Pausable)

-[Pub] transfer #

-modifiers: whenNotPaused

-[Pub] transferFrom #

-modifiers: whenNotPaused

-[Pub] approve #

-modifiers: whenNotPaused

-[Pub] increaseApproval #

-modifiers: whenNotPaused

-[Pub] decreaseApproval #

-modifiers: whenNotPaused

+ RepublicToken (PausableToken, BurnableToken)

-[Pub] RepublicToken

-[Pub] transferTokens

-modifiers: onlyOwner

(\$) = payable function

= non-constant function

Issues Checking Status

No.	Title	Status
1.	Unlocked Compiler Version	Low issue
2.	Missing Input Validation	Passed
3.	Race conditions and Reentrancy. Cross-function race conditions.	Passed
4.	Possible delays in data delivery	Passed
5.	Oracle calls.	Passed
6.	Timestamp dependence.	Passed
7.	Integer Overflow and Underflow	Passed
8.	DoS with Revert.	Passed
9.	DoS with block gas limit.	Passed
10.	Methods execution permissions.	Passed
11.	Economy model of the contract.	Passed
12.	Private use data leaks.	Passed
13.	Malicious Event log.	Passed
14.	Scoping and Declarations.	Passed
15.	Uninitialized storage pointers.	Passed
16.	Arithmetic accuracy.	Passed
17.	Design Logic.	Passed
18.	Safe Open Zeppelin contracts implementation and usage.	Passed
19.	Incorrect Naming State Variable	Passed
20.	Compiler version too old	Low issue

Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to assets loss or data manipulations.
High	High-level vulnerabilities are difficult to exploit; however, they also have a significant impact on smart contract execution, e.g., public access to crucial functions
Medium	Medium-level vulnerabilities are important to fix; however, they can't lead to assets loss or data manipulations.
Low	Low-level vulnerabilities are mostly related to outdated, unused, etc. code snippets that can't have a significant impact on execution.

Security Issues

✔ Critical Severity Issues

No critical severity issue found.

✔ High Severity Issues

No high severity issue found.

✔ Medium Severity Issues

No medium severity issues found.

✔ Low Severity Issues

Two low severity issue found.

1. Unlocked Compiler Version.

- **Description**

The contract utilizes an unlocked compiler version. An unlocked compiler version in the contract's source code 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 differing compiler version numbers. This can lead to ambiguity when debugging as compiler-specific bugs may occur in the codebase that would be difficult to identify over a span of multiple compiler versions rather than a specific one.

- **Recommendation**

It is advisable that the compiler version is alternatively locked at the lowest version possible so that the contract can be compiled. For example, for version ^0.4.13 the contract should contain the following line:

```
pragma solidity 0.4.13;
```

2. Too old compiler version

- **Description**

Compiler version is old.

- **Recommendation**

It is advisable that the compiler version is new rather than older one which provide more security and transparency in code.

Centralization

Owner Privileges

- REN Contract:
 - Owner can transfer ownership.
 - Owner can pause and unpause transfer tokens.
 - Owner can transfer tokens from owner address to beneficiary address.

This smart contract has some functions which can be executed by the Admin (Owner) only. If the admin wallet private key would be compromised, then it would create trouble. Following are Admin functions:

- **Transferownership** : owner can transfer ownership.
- **Pause** : owner can pause transfer.
- **Unpause** : owner can unpause transfer.
- **Transfertokens** : owner can transfer tokens to beneficiary address.

Conclusion

Smart contract contains low severity issues! The further transfer and operations with the fund raised are not related to this particular contract.

HackSafe note: Please check the disclaimer above and note, the audit makes no statements or warranties on business model, investment attractiveness or code sustainability. The report is provided for the only contract mentioned in the report and does not include any other potential contracts deployed by Owner.