



Code Security Assessment

CryptoRPG

Feb 15th, 2022

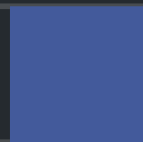


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Disclaimer

About

Summary

This report has been prepared for CryptoRPG to discover issues and vulnerabilities in the source code of the CryptoRPG 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	CryptoRPG
Platform	Ethereum
Language	Solidity
Codebase	https://github.com/cryptorpgapp/contracts/ https://bscscan.com/address/0x284643d9df25551A85D68eF903E59f8Ef90Bec01
Commit	d399caab8aa8a36e4a7baa48b9048202fb1ab27b

Audit Summary

Delivery Date	Feb 15, 2022
Audit Methodology	Static Analysis, Manual Review

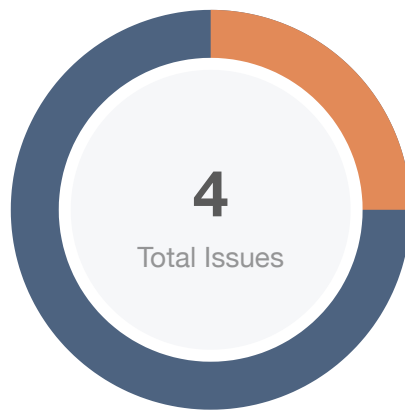
Vulnerability Summary

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

Audit Scope

ID	File	SHA256 Checksum
CRP	contracts/CryptoRPG.sol	3564953eeb6b7542d39cdf201964d5778f87d3db4d5b0fa4641424c020d9b6ce

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
CRP-01	Multiple Pragma Directives with Different Solidity Versions	Language Specific	● Informational	✓ Resolved
CRP-02	Unlocked Compiler Version	Language Specific	● Informational	✓ Resolved
CRP-03	Too Many Digit	Coding Style	● Informational	✓ Resolved
CRP-04	Initial Token Distribution	Centralization / Privilege	● Major	✓ Resolved

CRP-01 | Multiple Pragma Directives With Different Solidity Versions

Category	Severity	Location	Status
Language Specific	● Informational	contracts/CryptoRPG.sol: 13, 40, 125, 155, 511	🟢 Resolved

Description

There are multiple pragma directives declared throughout the contract, with different Solidity versions, including:

```
pragma solidity ^0.8.0;  
pragma solidity ^0.8.2;
```

Recommendation

We advise removing redundant pragma directives and using only one solidity version. Here, the solidity version should be `0.8.2` or greater, for example, for the `0.8.2` version the contract should have this unique pragma statement:

```
pragma solidity 0.8.2;
```

Alleviation

[Certik]: CryptoRPG team heeded the advice and resolved the finding in the deployment <https://bscscan.com/address/0x284643d9df25551A85D68eF903E59f8Ef90Bec01>

CRP-02 | Unlocked Compiler Version

Category	Severity	Location	Status
Language Specific	● Informational	contracts/CryptoRPG.sol: 511	✓ Resolved

Description

The contract has an 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 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 `v0.8.2` the contract should contain the following line:

```
pragma solidity 0.8.2;
```

Alleviation

[Certik]: CryptoRPG team heeded the advice and resolved the finding in the deployment

<https://bscscan.com/address/0x284643d9df25551A85D68eF903E59f8Ef90Bec01>

CRP-03 | Too Many Digit

Category	Severity	Location	Status
Coding Style	● Informational	contracts/CryptoRPG.sol: 516	✓ Resolved

Description

Literals with many digits are difficult to read and review.

Recommendation

We advise the client to use the scientific notation to improve readability. For example:

```
_mint(msg.sender, 21e9 * 10 ** decimals());
```

or

```
_mint(msg.sender, 21_000_000_000 * 10 ** decimals());
```

Alleviation

[Certik]: CryptoRPG team heeded the advice and resolved the finding in the deployment

<https://bscscan.com/address/0x284643d9df25551A85D68eF903E59f8Ef90Bec01>

CRP-04 | Initial Token Distribution

Category	Severity	Location	Status
Centralization / Privilege	● Major	contracts/CryptoRPG.sol: 516	🟢 Resolved

Description

All of the **RPG** tokens are sent to the contract deployer when deploying the contract. This could be a centralization risk as the deployer can distribute **RPG** tokens without obtaining the consensus of the community.

Recommendation

We recommend the team be transparent regarding the initial token distribution process, and the team shall make enough efforts to restrict the access of the private key.

Alleviation

[CryptoRPG]: We're transparent regarding the distribution as written and published on our whitepaper. In addition, to meet the requirement of initial liquidity offerings on the launchpad, we will commit our reserve to be under a time-lock offered by third-party verifiable solutions. For more details, please refer to the following link. If you need more information, we would be very pleased to provide it.

<https://wp.cryptorpg.app/tokenomics/distribution>

[Certik]: On Feb-16-2022 01:38:37 AM +UTC, at block number 15293216 on the Binance Smart Chain, these three addresses owns more than 94.7% of the total supply of the CryptoRPG token at the address of [0x284643d9df25551a85d68ef903e59f8ef90bec01](https://bscscan.com/address/0x284643d9df25551a85d68ef903e59f8ef90bec01):

- [0x6d79a46342a3b0369c30c956b5380faea7ad8413](https://bscscan.com/address/0x6d79a46342a3b0369c30c956b5380faea7ad8413), which is an upgradeable smart contract, owns **500,000,000 RPG** (50%).
- [UniCrypt: Token Vesting](#), which is TokenVesting contract, owns **294,999,999 RPG** (29.5%).
- [0xece245940eb34f791c6e2f458f2359bc0ef9a49c](https://bscscan.com/address/0xece245940eb34f791c6e2f458f2359bc0ef9a49c), which is Presale01 contract, owns **152,872,500 RPG** (15.2873%).

The deployer address: [0x099915fd2f50ebc77c3fe1d2ff172141b7688ee3](https://bscscan.com/address/0x099915fd2f50ebc77c3fe1d2ff172141b7688ee3) own 51,091,373 **RPG** token.

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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