CERTIK

Security Assessment

Bosagora

Apr 15th, 2021

Summary

This report has been prepared for Bosagora smart contracts, to discover issues and vulnerabilities in the source code of their Smart Contract as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Dynamic Analysis, 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 given they are currently missing in the repository;
- Provide more comments per each function for readability, especially contracts are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

Overview

Project Summary

Project Name	Bosagora
Description	A standard BEP-20 smart contract with owner mintable capability
Platform	BSC
Language	Solidity
Codebase	https://github.com/bosagora/bosagora-erc20/blob/BEP20/BSC-contracts/BSC-BEP20-BOA.sol
Commits	14be0d23ab54370c55b29a06e01b9ea1f4c18bb5

Audit Summary

Delivery Date	Apr 15, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

Vulnerability Summary

Total Issues	1
Critical	0
Major	0
Minor	0
Informational	1
Discussion	0

Audit Scope

ID	file	SHA256 Checksum
BOA	boa.sol	6cd8033ef4d6ca1659763a79ef90649a81f8d779e129c52d990659daf462a06d

Centralization

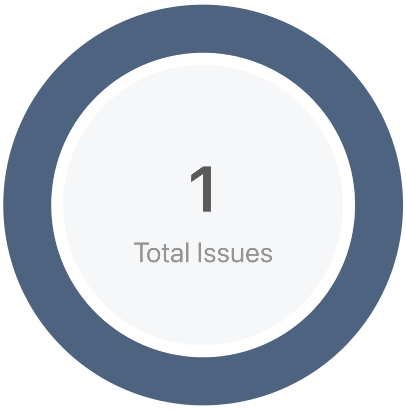
This is a standard BEP-20 token smart contract. The `onlyOwner` address can mint desire amount in the smart contract.

- `mint()` in `BOA-BEP20` contract

The advantage of the above functions in the codebase is that the client reserves the ability to adjust the project according to the runtime require to best serve the community. It is also worthy of note the potential drawbacks of these functions, which should be clearly stated through client's action/plan on how to prevent abuse of the these functionalities

To improve the trustworthiness of the project, any dynamic runtime updates in the project should be notified to the community. Any plan to implement aforementioned functions must be also considered to adopt Timelock with reasonable delay to allow the user to withdraw their funds, Multisig with community-selected 3-party independent co-signers, and/or DAO with transparent governance with the project's community in the project to manage sensitive role accesses.

Findings



Critical	**0** (0.00%)
Major	**0** (0.00%)
Minor	**0** (0.00%)
Informational	**1** (100.00%)
Discussion	**0** (0.00%)

ID	Title	Category	Severity	Status
BOA-01	Proper Usage of `public` and `external` type	Gas Optimization	Informational	Pending

BOA-01 | Proper Usage of `public` and `external` type

Category	Severity	Location	Status
Gas Optimization	Informational	boa.sol: 316, 325, 465, 484, 497	Pending

Description

`public` functions that are never called by the contract could be declared `external`. When the inputs are arrays `external` functions are more efficient than "public" functions. Examples:

- `renounceOwnership()`
- `transferOwnership()`
- `increaseAllowance()`
- `decreaseAllowance()`
- `mint()`

Recommendation

We advise the client to consider using the `external` attribute for functions never called from the contract.

Appendix

Finding Categories

Gas Optimization

Gas Optimization findings refer to exhibits that do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

Mathematical Operations

Mathematical Operation exhibits entail findings that relate to mishandling of math formulas, such as overflows, incorrect operations etc.

Logical Issue

Logical Issue findings are exhibits that detail a fault in the logic of the linked code, such as an incorrect notion on how block.timestamp works.

Control Flow

Control Flow findings concern the access control imposed on functions, such as owner-only functions being invoke-able by anyone under certain circumstances.

Volatile Code

Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that may result in a vulnerability.

Data Flow

Data Flow findings describe faults in the way data is handled at rest and in memory, such as the result of a struct assignment operation affecting an in-memory struct rather than an in storage one.

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 and comment on how to make the codebase more legible and as a result easily maintainable.

Inconsistency

Inconsistency findings refer to functions that should seemingly behave similarly yet contain different code, such as a constructor assignment imposing different require statements on the input variables than a setter function.

Magic Numbers

Magic Number findings refer to numeric literals that are expressed in the codebase in their raw format and should otherwise be specified as constant contract variables aiding in their legibility and maintainability.

Compiler Error

Compiler Error findings refer to an error in the structure of the code that renders it impossible to compile using the specified version of the project.

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Blockchain technology and cryptographic assets present a high level of ongoing risk. CertiK's position is that each company and individual are responsible for their own due diligence and continuous security. CertiK's goal is to help reduce the attack vectors and the high level of variance associated with utilizing new and consistently changing technologies, and in no way claims any guarantee of security or functionality of the technology we agree to analyze.

About

Founded in 2017 by leading academics in the field of Computer Science from both Yale and Columbia University, CertiK is a leading blockchain security company that serves to verify the security and correctness of smart contracts and blockchain-based protocols. Through the utilization of our world-class technical expertise, alongside our proprietary, innovative tech, we're able to support the success of our clients with best-in-class security, all whilst realizing our overarching vision; provable trust for all throughout all facets of blockchain.

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