CERTIK

Code Security Assessment

Boba Token

Oct 5th, 2021

Table of Contents

Summary

This report has been prepared for Boba Network to discover issues and vulnerabilities in the source code of the Boba Token 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	Boba Token
Description	An extension of ERC20 to support Compound-like voting and delegation
Platform	Ethereum
Language	Solidity
Codebase	https://etherscan.io/address/0x42bbfa2e77757c645eeaad1655e0911a7553efbc
Commit	

Audit Summary

Delivery Date	Oct 05, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	BOBA

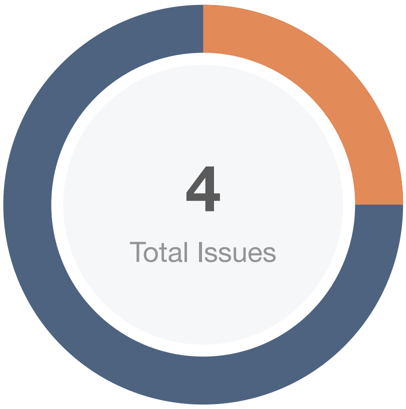
Vulnerability Summary

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

Audit Scope

ID	File	SHA256 Checksum
BOB	BOBA.sol	47ac8548d5a3d5aa624d49f06137f1686a37f88840cdc23ab010593d9412344a

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
BOB-01	Initial token distribution	Logical Issue	Major	Acknowledged
BOB-02	Unlocked Compiler Version	Coding Style	Informational	Acknowledged
BOB-03	ERC-20 Inherent Approval Race Condition	Volatile Code	Informational	Acknowledged
BOB-04	Front-running Attack on Permit Function	Volatile Code	Informational	Acknowledged

BOB-01 | Initial Token Distribution

Category	Severity	Location	Status
Logical Issue	Major	BOBA.sol: 42	Acknowledged

Description

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

Recommendation

We recommend the team to be transparent regarding the initial token distribution process carefully manage the `msg.sender` account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol to be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., Multi-signature wallets.

Indicatively, here is some feasible suggestions that would also mitigate the potential risk at the different level in term of short-term and long-term:

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key;
- Introduction of a DAO/governance/voting module to increase transparency and user involvement.

BOB-02 | Unlocked Compiler Version

Category	Severity	Location	Status
Coding Style	● Informational	BOBA.sol: 2	ⓘ Acknowledged

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 differing compiler version numbers. 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 `v0.8.0` the contract should contain the following line:

```
pragma solidity 0.8.0;
```

BOB-03 | ERC-20 Inherent Approval Race Condition

Category	Severity	Location	Status
Volatile Code	● Informational	BOBA.sol: 27	ⓘ Acknowledged

Description

The ERC-20 standard contains a well-known flaw in its design whereby a race condition is introduced using its approve and transferFrom methods.

Reference: https://github.com/ethereum/EIPs/issues/20#issuecomment-263524729

Recommendation

While this would solely be exploitable in case of mishandling by the users, it should still betaken into consideration if the token is aimed to be utilised as a payment gateway. To this end, we advise that the increaseApproval and decreaseApproval functions are coded that prohibit this attack vector from being exploited.

BOB-04 | Front-running Attack On Permit Function

Category	Severity	Location	Status
Volatile Code	● Informational	BOBA.sol: 27	ⓘ Acknowledged

Description

The token contracts implement permit, please aware the potential front-run risk. Though the signer of a Permit may have a certain party in mind to submit their transaction, another party can always front-run this transaction and call the permit before the intended party. The end result is the same for the Permit signer, however.

Recommendation

Document the possibility and make users aware of this.

Appendix

Finding Categories

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.

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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