Security Assessment

NFTmall GEM Token

May 6th, 2021

Summary

This report has been prepared for NFTmall GEM Token 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 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	NFTmall GEM Token
Platform	BSC
Language	Solidity
Codebase	https://github.com/NFTmall/token-contract/tree/2a2af2380df7394f7c0a203f8ecad3c65c8388a4/contracts
Commits	1. 2a2af2380df7394f7c0a203f8ecad3c65c8388a4 2. 9ba69de42323a365921d94d62d417245c2d4f89f

Audit Summary

Delivery Date	May 06, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

Vulnerability Summary

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

Audit Scope

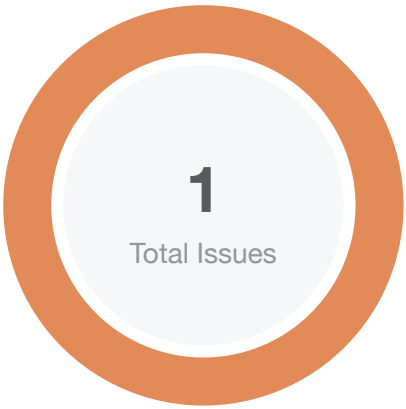
ID	file	SHA256 Checksum
GEM	GEM.sol	18a3dfeee1342fff8eef5d5f8db37d9141ddd65bce3a0f3f7275e01f5bb55539
MNF	truffle/Migrations.sol	4f7fb5fbcac6b787cd6583772c9756b5aecaa2c72a64d97aee6881f5d24dfd60

To set up the project correctly, improve overall project quality and preserve upgradability, the following role is adopted in the codebase:

`DEFAULT_ADMIN_ROLE`, is adopted to pause or unpause contract `GEM`.

To improve the trustworthiness of the project, and dynamic runtime updates in the project should be notified to the community. Any plan to invoke aforementioned functions should be also considered to move to the execution queue of `Timelock` contract.

Findings



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

ID	Title	Category	Severity	Status
GEM-01	Centralization Risks	Centralization / Privilege	Major	Resolved

GEM-01 | Centralization Risks

Category	Severity	Location	Status
Centralization / Privilege	**Major**	GEM.sol: 79, 87, 95, 102	**Resolved**

Description

The role `admin` has authority to withdraw native token (ETH or BNB) and other tokens, which support method `safeTransfer(address, uint256)`, `transferFrom(address, address, uint256)` or `safeTransferFrom(address, address, uint256, uint256, bytes calldata)`, from the contract.

However, if the contract is a token contract and should never hold any tokens, in this case the withdraw functions from the contract would not become an issue.

Recommendation

We advise the client to handle the `admin` account carefully to avoid any potential hack. We also advise the client to consider the following solutions:

1. `Timelock` with reasonable latency for community awareness on privileged operations;
2. Multisig with community-voted 3rd-party independent co-signers;
3. DAO or Governance module increasing transparency and community involvement.

Alleviation

The client heeded our advice and recommendation. Function `withdrawETH()`, `withdrawERC20()`, `withdrawERC721()` and `withdrawERC1155()` are removed in commit `7c723e43ba15a438dc689118dce0a530e9c74e7f`.

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.

Gas Optimization

Gas Optimization findings 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 findings relate to mishandling of math formulas, such as overflows, incorrect operations etc.

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.

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 but rather 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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About

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