Code Security Assessment

Goldefy

Mar 2nd, 2022

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Summary

This report has been prepared for Goldefy to discover issues and vulnerabilities in the source code of the Goldefy 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	Goldefy
Description	ERC20
Platform	BSC
Language	Solidity
Codebase	Files provided by the client
Commit	

Audit Summary

Delivery Date	Mar 02, 2022 UTC
Audit Methodology	Static Analysis, Manual Review

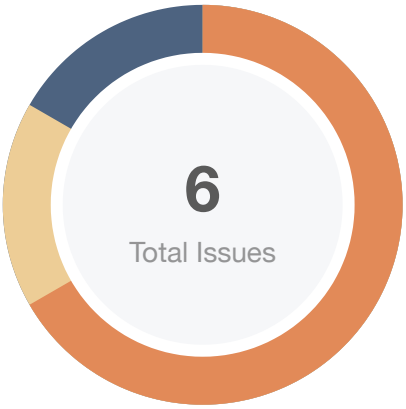
Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Mitigated	Resolved
Critical	0	0	0	0	0	0	0
Major	4	0	0	4	0	0	0
Medium	0	0	0	0	0	0	0
Minor	1	0	0	0	1	0	0
Informational	1	0	0	1	0	0	0
Discussion	0	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
ERM	token/ERC20/behaviours/ERC20Mintable.sol	a6df26859ab36ecbd5e71eb7b354b7429b121919cfb856fe1579a109fa334464
GER	token/ERC20/GoldefyERC20.sol	99b87b91f42aff5a6dc59c41246e52cbd6f0a261ac4e8922254d6c93c7cf539e

Findings



Critical	**0** (0.00%)
Major	**4** (66.67%)
Medium	**0** (0.00%)
Minor	**1** (16.67%)
Informational	**1** (16.67%)
Discussion	**0** (0.00%)

ID	Title	Category	Severity	Status
GER-01	Initial Token Distribution	**Centralization / Privilege**	**Major**	Acknowledged
GER-02	Mintable Token	**Centralization / Privilege**	**Major**	Acknowledged
GER-03	Invisible Implementation of Contract `antisnipe`	Volatile Code	Major	Acknowledged
GER-04	Third Party Dependencies	Volatile Code	Minor	Partially Resolved
GER-05	Centralization Risk in GoldefyERC20.sol	**Centralization / Privilege**	**Major**	Acknowledged
GER-06	Missing Error Messages	Coding Style	Informational	Acknowledged

GER-01 | Initial Token Distribution

Category	Severity	Location	Status
Centralization / Privilege	Major	token/ERC20/GoldefyERC20.sol: 48	Acknowledged

Description

```
39      constructor (
40          string memory name,
41          string memory symbol,
42          uint8 decimals,
43          uint256 initialBalance
44      )
45          ERC1363(name, symbol)
46      {
47          _setupDecimals(decimals);
48          _mint(_msgSender(), initialBalance);
49      }
```

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

Recommendation

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

Alleviation

The team has acknowledged this finding.

GER-02 | Mintable Token

Category	Severity	Location	Status
Centralization / Privilege	Major	token/ERC20/GoldefyERC20.sol: 70~72	Acknowledged

Description

Function `mint()` in contract `ERC20Mintable`:

```
44      function mint(address account, uint256 amount) public canMint {
45          _mint(account, amount);
46      }
```

Function `_mint()` in contract `GoldefyERC20`:

```
70      function _mint(address account, uint256 amount) internal override onlyMinter {
71          super._mint(account, amount);
72      }
```

Modifier `onlyMinter()` in contract `Roles`:

```
20      modifier onlyMinter() {
21          require(hasRole(MINTER_ROLE, _msgSender()), "Roles: caller does not have the MINTER
role");
22          _;
23      }
```

The role `MINTER_ROLE` in contract `GoldefyERC20` has authority over the function `_mint()`. Any compromise to the account may allow a hacker to take advantage of this authority and mint tokens to any account.

Recommendation

The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralization, which in most cases cannot be resolved entirely at the present stage. We advise the client to carefully manage the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., multi-signature wallets.

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

Short Term:

Timelock and Multi sign (⅔, ⅗) combination *mitigate* by delaying the sensitive operation and avoiding a single point of key management failure.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key compromised;
  AND
- A medium/blog link for sharing the timelock contract and multi-signers addresses information with the public audience.

Long Term:

Timelock and DAO, the combination, *mitigate* by applying decentralization and transparency.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND
- Introduction of a DAO/governance/voting module to increase transparency and user involvement;
  AND
- A medium/blog link for sharing the timelock contract, multi-signers addresses, and DAO information with the public audience.

Permanent:

Renouncing the ownership or removing the function can be considered *fully resolved*.

- Renounce the ownership and never claim back the privileged roles;
  OR
- Remove the risky functionality.

Noted: Recommend considering the long-term solution or the permanent solution. The project team shall make a decision based on the current state of their project, timeline, and project resources.

Alleviation

[Goldefy Team]:

1. Mint related functions will be managed through Openzeppelin Defender and Gnosis Safe, and multisig based on 3 of 4 minting will be applied.
2. The Gnosis Safe address is designated as the Contract Default Admin Role in the contract creator.
3. The account address to participate in Multi-Sig will be announced on the homepage, Medium and blog.

GER-03 | Invisible Implementation Of Contract `antisnipe`

Category	Severity	Location	Status
Volatile Code	Major	token/ERC20/GoldefyERC20.sol: 51	Acknowledged

Description

```
51    IAntisnipe public antisnipe = IAntisnipe(0xbccE75E1b2C953C83B462F80865f408112CE29A2);
```

```
86    function _beforeTokenTransfer(
87      address from,
88      address to,
89      uint256 amount
90    ) internal override {
91      if (from == address(0) || to == address(0)) return;
92      if (liquidityRestrictionEnabled && address(liquidityRestrictor) != address(0)) {
93          (bool allow, string memory message) = liquidityRestrictor
94              .assureLiquidityRestrictions(from, to);
95          require(allow, message);
96      }
97
98      if (antisnipeEnabled && address(antisnipe) != address(0)) {
99          require(antisnipe.assureCanTransfer(msg.sender, from, to, amount));
100     }
101   }
```

The implementation of contract `antisnipe` is invisible on BscScan, so we are unable to evaluate its functionality and security.

Recommendation

We recommend verifying and publishing the code of contract `antisnipe` on BscScan.

Alleviation

The team has acknowledged this finding.

GER-04 | Third Party Dependencies

Category	Severity	Location	Status
Volatile Code	Minor	token/ERC20/GoldefyERC20.sol: 51~52	Partially Resolved

Description

The contract `GoldefyERC20` is serving as the underlying entity to interact with third parties `antisnipe` and `liquidityRestrictor` protocols. The scope of the audit treats 3rd party entities as black boxes and assumes their functional correctness. However, in the real world, 3rd parties can be compromised and this may lead to lost or stolen assets.

Moreover, the addresses of these third parties can be updated through functions `setAntisnipeAddress()` and `setLiquidityRestrictionAddress()`.

Recommendation

We understand that the business logic of `GoldefyERC20` requires interaction with `antisnipe` and `liquidityRestrictor`. We encourage the team to constantly monitor the statuses of 3rd parties to mitigate the side effects when unexpected activities are observed.

Alleviation

[Goldefy Team]: It is a contract that is already being used in other NFT and DeFi related projects, and if an error occurs in the contract, the method for immediate stop and address change is implemented as a fallback as follows:

- setAntisnipeDisable
- setLiquidityRestrictorDisable
- setAntisnipeAddress
- setLiquidityRestrictionAddress

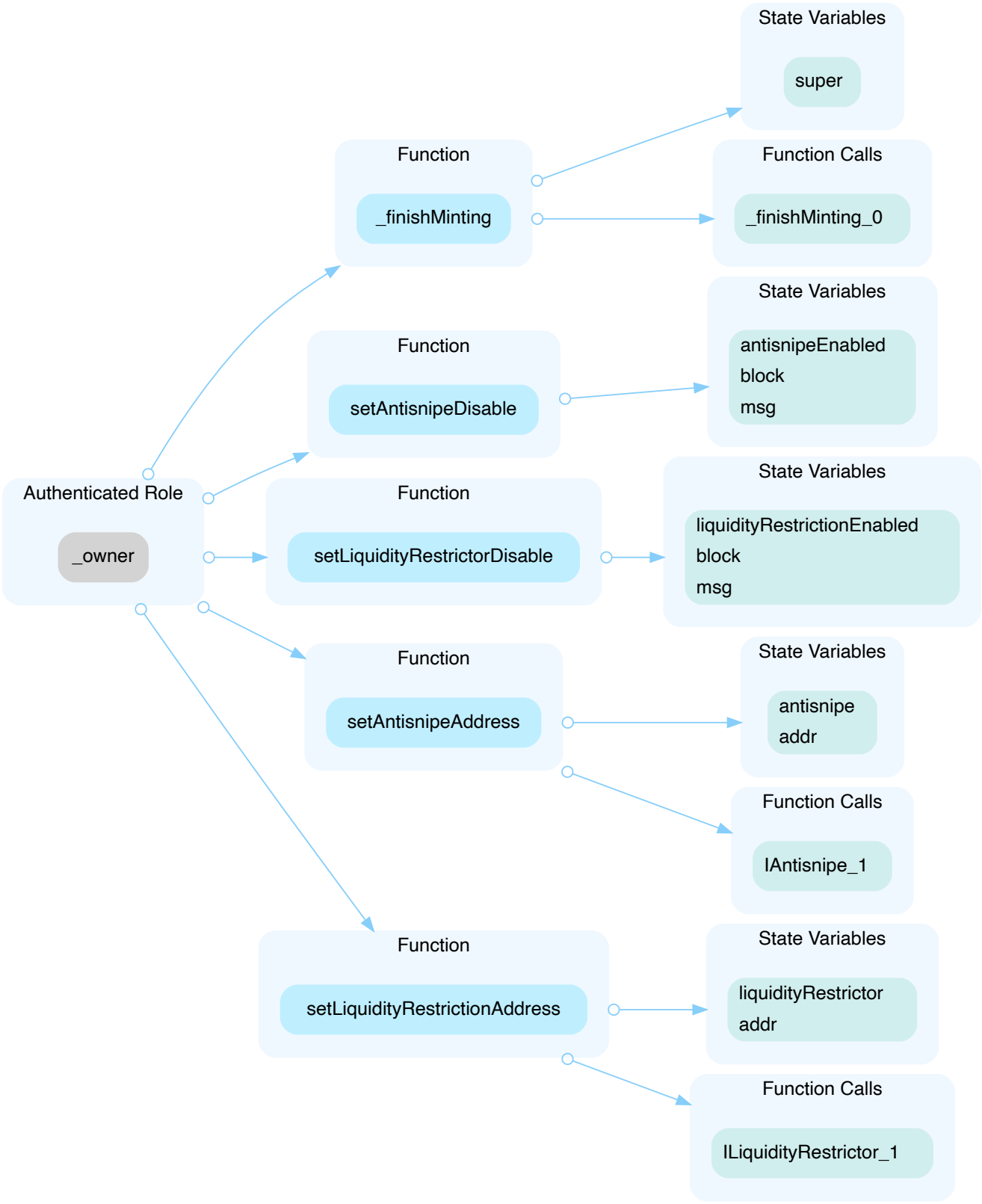
GER-05 | Centralization Risk In GoldefyERC20.sol

Category	Severity	Location	Status
Centralization / Privilege	**Major**	token/ERC20/GoldefyERC20.sol: 79~81, 106~110, 115~119, 124~127, 132~135	Acknowledged

Description

In the contract, `GoldefyERC20`, the role, `_owner`, has authority over the functions shown in the diagram below.

Any compromise to the `_owner` account may allow the hacker to take advantage of this authority and related functions.



Recommendation

The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralization, which in most cases cannot be resolved entirely at the present

stage. We advise the client to carefully manage the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., multisignature wallets.

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

Short Term:

Timelock and Multi sign (⅔, ⅗) combination *mitigate* by delaying the sensitive operation and avoiding a single point of key management failure.

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Long Term:

Timelock and DAO, the combination, *mitigate* by applying decentralization and transparency.

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  AND
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- A medium/blog link for sharing the timelock contract, multi-signers addresses, and DAO information with the public audience.

Permanent:

Renouncing the ownership or removing the function can be considered *fully resolved*.

- Renounce the ownership and never claim back the privileged roles.
  OR
- Remove the risky functionality.

Alleviation

[Goldefy Team]:

1. We plan to manage related functions through Openzeppelin Defender and Gnosis Safe, and apply multisig of 3 of 4 standards.
2. Processed to designate the Gnosis Safe address as the Contract Default Admin Role to the contract creator.
3. The account address to participate in Multi-Sig will be announced on the homepage, Medium and blog

GER-06 | Missing Error Messages

Category	Severity	Location	Status
Coding Style	Informational	token/ERC20/GoldefyERC20.sol: 99, 107, 116	Acknowledged

Description

The **require** can be used to check for conditions and throw an exception if the condition is not met. It is better to provide a string message containing details about the error that will be passed back to the caller.

Recommendation

We advise adding error messages to the linked **require** statements.

Alleviation

The team has acknowledged this finding.

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.

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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