Security Assessment

Galaxy Snake GSK

Jan 5th, 2022

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Summary

This report has been prepared for Galaxy Snake GSK to discover issues and vulnerabilities in the source code of the Galaxy Snake GSK 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	Galaxy Snake GSK
Platform	BSC
Language	Solidity
Codebase	https://github.com/GFLOPL/Galaxy-snake-GSK-contract
Commit	0fa529ac359e3b57c42f4bd50ccd0ae763cba063

Audit Summary

Delivery Date	Jan 05, 2022
Audit Methodology	Static Analysis, Manual Review
Key Components	

Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Resolved
Critical	0	0	0	0	0	0
Major	2	0	0	2	0	0
Medium	1	0	0	1	0	0
Minor	2	0	0	2	0	0
Informational	5	0	0	5	0	0
Discussion	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
GSS	token.sol	a61951051314e7903b08f1d290fdfb237043e02d958001b9e5c5074b8cf311bd

Findings

Critical	**0** (0.00%)
Major	**2** (20.00%)
Medium	**1** (10.00%)
Minor	**2** (20.00%)
Informational	**5** (50.00%)
Discussion	**0** (0.00%)

ID	Title	Category	Severity	Status
GSS-01	Redundant SafeMath Usage	Language Specific	Informational	Acknowledged
GSS-02	Centralization Risk in token.sol	**Centralization / Privilege**	**Major**	Acknowledged
GSS-03	Variables that could be declared as `constant`	Gas Optimization	Informational	Acknowledged
GSS-04	Missing emit events	Coding Style	Informational	Acknowledged
GSS-05	Improper usage of `public` and `external` type	Gas Optimization	Informational	Acknowledged
GSS-06	Unlocked compiler version	Language Specific	Informational	Acknowledged
GSS-07	`allowance` Not Updated in `transferFrom()`	Volatile Code	Major	Acknowledged
GSS-08	Dangerous usage of block.timestamp	Logical Issue	Minor	Acknowledged
GSS-09	Initial Token Distribution	**Centralization / Privilege**	**Medium**	Acknowledged
GSS-10	Missing Input Validation	Volatile Code	Minor	Acknowledged

GSS-01 | Redundant SafeMath Usage

Category	Severity	Location	Status
Language Specific	Informational	Galaxy-Snake-GSK/token.sol (3c415ae): 4~115	Acknowledged

Description

Solidity version >=0.8.0 includes checked arithmetic operations and underflow/overflow by default, making SafeMath redundant.

Recommendation

We recommend to remove the SafeMath library.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-02 | Centralization Risk in token.sol

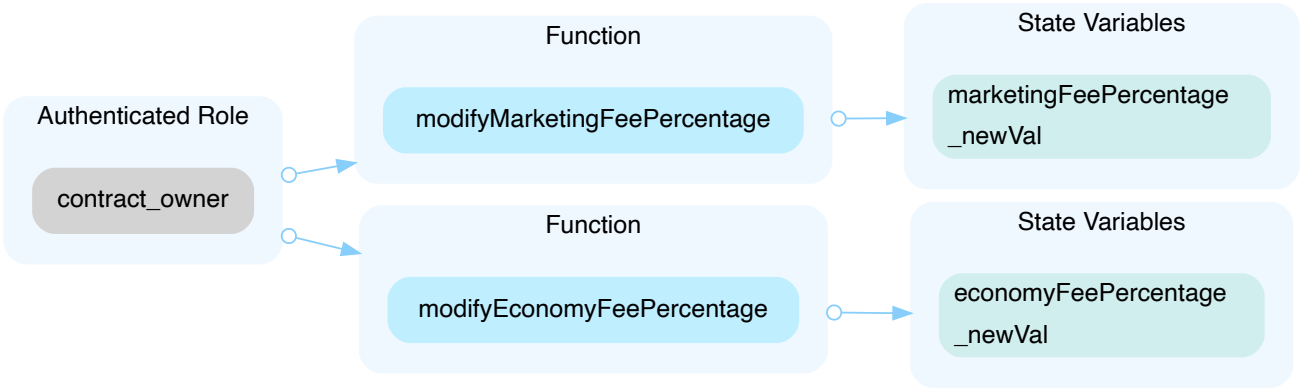
Category	Severity	Location	Status
Centralization / Privilege	**Major**	Galaxy-Snake-GSK/token.sol (3c415ae): 144~146, 148~150, 144~146, 148~150	Acknowledged

Description

In the contract, `SnakeTokenContract`, the role, `contract_owner`, has the authority over the functions below:

- modifyMarketingFeePercentage(), to set a new `marketingFeePercentage`.
- modifyEconomyFeePercentage(), to set a new `economyFeePercentage`.

Any compromise to the privileged account which has access to `contract_owner` may allow the hacker to take advantage of this.



Recommendation

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 to be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., Multisignature 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.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-03 | Variables that could be declared as `constant`

Category	Severity	Location	Status
Gas Optimization	Informational	Galaxy-Snake-GSK/token.sol (3c415ae): 122, 123, 124, 125, 126, 131, 132	Acknowledged

Description

The linked variables could be declared as `constant` since these state variables are never modified.

Recommendation

We recommend to declare these variables as `constant`.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-04 | Missing emit events

Category	Severity	Location	Status
Coding Style	Informational	Galaxy-Snake-GSK/token.sol (3c415ae): 144~146, 148~150	Acknowledged

Description

There should always be events emitted in the sensitive functions that are controlled by centralization roles.

Recommendation

It is recommended emitting events for the sensitive functions that are controlled by centralization roles.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-05 | Improper usage of `public` and `external` type

Category	Severity	Location	Status
Gas Optimization	Informational	Galaxy-Snake-GSK/token.sol (3c415ae): 177~188, 190~194, 165~175	Acknowledged

Description

`public` functions that are never called by the contract could be declared as `external`. `external` functions are more efficient than `public` functions.

Recommendation

Consider using the external attribute for public functions that are never called within the contract.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-06 | Unlocked compiler version

Category	Severity	Location	Status
Language Specific	Informational	Galaxy-Snake-GSK/token.sol (3c415ae): 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 different compiler versions. 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 `v0.6.2` the contract should contain the following line:

```
pragma solidity 0.6.2;
```

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-07 | `allowance` Not Updated in `transferFrom()`

Category	Severity	Location	Status
Volatile Code	Major	Galaxy-Snake-GSK/token.sol (3c415ae): 189	Acknowledged

Description

The function `transferFrom()` does not update the allowance of the `msg.sender` after a successful transfer. User A could drain User B's token balance by repeatedly calling `transferFrom()` should User B approve User A for any non-zero amount.

Recommendation

We recommend updating a `msg.sender`'s allowance when calling `transferFrom()`.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-08 | Dangerous usage of block.timestamp

Category	Severity	Location	Status
Logical Issue	Minor	Galaxy-Snake-GSK/token.sol (3c415ae)	Acknowledged

Description

Miners have the ability to adjust timestamps slightly, hence it is not safe to use block.timestamp as the deciding factor .

Recommendation

We advise the client to use other methods (e.g. block.number) to lock the wallet.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-09 | Initial Token Distribution

Category	Severity	Location	Status
Centralization / Privilege	Medium	Galaxy-Snake-GSK/token.sol (3c415ae)	Acknowledged

Description

All of the tokens are sent to the `contract_owner`(0xD9084DbEBfF533Ea83C70F0C296B791Ec8c462fb) and `Dev`(0xc3764A6dA76782B621958f9BB42EF3c109274B67) address when deploying the contract. This could be a centralization risk as the `contract_owner` or `Dev` can distribute tokens without obtaining the consensus of the community.

Recommendation

We recommend the team be transparent regarding the initial token distribution process. Besides, we advise the client to carefully manage the project'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.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

GSS-10 | Missing Input Validation

Category	Severity	Location	Status
Volatile Code	Minor	Galaxy-Snake-GSK/token.sol (3c415ae): 144~150	Acknowledged

Description

The `_newVal` should range from 0 to 99, and `economyFeePercentage + marketingFeePercentage < 99` should be checked as well.

Recommendation

We advise the client to add the check for the passed-in values as aforementioned information.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

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.

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.

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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