Security Assessment

Galaxy Finance

Jun 3rd, 2021

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Summary

This report has been prepared for Galaxy Finance 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	Galaxy Finance
Description	Galaxy Finance is the innovative blockchain financial product with "stranger trust network" as its underlying architecture.
Platform	Ethereum
Language	Solidity
Codebase	https://github.com/GFC-Eco/gfc-doucuments/blob/main/code/LpPool.full.sol
Commits	<1a121e86132b4adb8d478ed8cff08885afb0d54b> <c90f7b346e1076e07aab0ea67886402b8b49270a>

Audit Summary

Delivery Date	Jun 03, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

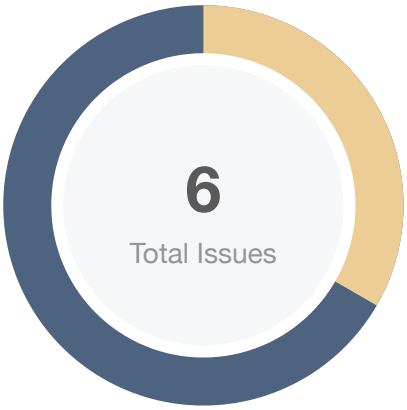
Vulnerability Summary

Total Issues	6
Critical	0
Major	0
Medium	0
Minor	2
Informational	4
Discussion	0

Audit Scope

ID	file	SHA256 Checksum
LPG	LpPool.full.sol	01f348127650b45fef753bf387fc4cf13be31b3392dd6f4b16dc734edc9ffa19

Findings



Critical	0 (0.00%)
Major	0 (0.00%)
Medium	0 (0.00%)
Minor	2 (33.33%)
Informational	4 (66.67%)
Discussion	0 (0.00%)

ID	Title	Category	Severity	Status
LPG-01	Lack of Input Validation	Volatile Code	Informational	Resolved
LPG-02	Risk For Weak Randomness	Logical Issue	Minor	Acknowledged
LPG-03	Redundant code	Logical Issue	Informational	Resolved
LPG-04	Missing Emit Events	Optimization	Informational	Resolved
LPG-05	SafeMath Not Used	Mathematical Operations	Informational	Resolved
LPG-06	Potential Calculation Overflow	Volatile Code	Minor	Resolved

LPG-01 | Lack of Input Validation

Category	Severity	Location	Status
Volatile Code	Informational	LpPool.full.sol: 630~632	Resolved

Description

The assigned value to `_lp` in the constructor of `LpPool.full.sol` should be verified as a non-zero value to prevent error.

The assigned value to `_gfv` in the constructor of `LpPool.full.sol` should be verified as a non-zero value to prevent error.

The assigned value to `_nft` in the constructor of `LpPool.full.sol` should be verified as a non-zero value to prevent error.

Recommendation

Check that the passed-in values are non-zero values.

Example:

```
require(lp != address(0), "lp is a zero value");
require(gfv != address(0), "gfv is a zero value");
require(nft != address(0), "nft is a zero value");
```

Alleviation

The development team heeded our advice and resolved this issue in commit c90f7b346e1076e07aab0ea67886402b8b49270a.

LPG-02 | Risk For Weak Randomness

Category	Severity	Location	Status
Logical Issue	Minor	LpPool.full.sol: 799	Acknowledged

Description

It is now well understood that the difficulty or timestamp is not a source of randomness. They can be manipulated if the attacker is also a miner.

Recommendation

Consider mixing a seed value based on the chainlink random service(https://docs.chain.link/docs/get-a-random-number/).

Alleviation

No alleviation.

LPG-03 | Redundant code

Category	Severity	Location	Status
Logical Issue	Informational	LpPool.full.sol: 674	Resolved

Description

The code `mul(20).div(100)` can be replaced by `div(5)`

Recommendation

Consider simplifying the code as below:

```
earnGFV = amount.mul(profitTime).div(5).div(duration);
```

Alleviation

The development team resolved this issue in commit c90f7b346e1076e07aab0ea67886402b8b49270a.

LPG-04 | Missing Emit Events

Category	Severity	Location	Status
Optimization	Informational	LpPool.full.sol: 704, 693	Resolved

Description

Several key actions are defined without event declarations.

Recommendation

Consider emitting events for key actions.

Alleviation

The development team heeded our advice and resolved this issue in commit c90f7b346e1076e07aab0ea67886402b8b49270a.

LPG-05 | SafeMath Not Used

Category	Severity	Location	Status
Mathematical Operations	Informational	LpPool.full.sol: 800	Resolved

Description

SafeMath is not used making it possible for overflow/underflow, which will lead to an inaccurate message.

Recommendation

Consider using SafeMath library

```
randomNum.mod(length)
```

Alleviation

The development team heeded our advice and resolved this issue in commit c90f7b346e1076e07aab0ea67886402b8b49270a.

LPG-06 | Potential Calculation Overflow

Category	Severity	Location	Status
Volatile Code	Minor	LpPool.full.sol: 672, 681, 684	Resolved

Description

The calculation of `profitTime` below may cause overflow:

```
672  profitTime = startTime.add(duration).sub(_gfvProfit[account].updateTime);
```

Because the `updateTime` could be assigned to be a value greater than the end time.

```
684  _gfvProfit[account].updateTime = now;
```

Recommendation

Consider ensuring the `updateTime` less than or equals to the activity end time.

Alleviation

The development team heeded our advice and resolved this issue in commit c90f7b346e1076e07aab0ea67886402b8b49270a.

Appendix

Finding Categories

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.

Volatile Code

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

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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