CERTIK

Security Assessment

Lucky Lion Audit 2

Dec 2nd, 2021

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Summary

This report has been prepared for Lucky Lion to discover issues and vulnerabilities in the source code of the Lucky Lion Audit 2 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	Lucky Lion Audit 2
Description	Revenue Sharing Pool
Platform	BSC
Language	Solidity
Codebase	https://github.com/LuckyLionIO/LuckyLion-RevenueSharing/blob/main/contracts/RevenueSharingPool.sol
Commit	a1d134a9367191b04b2def9a84fc3734c3752dca c87022db0fd23de93cc367edfa5cfdd676265ec9 5b9970794f29d562ad1f219b646bb64afceadfb5

Audit Summary

Delivery Date	Dec 02, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

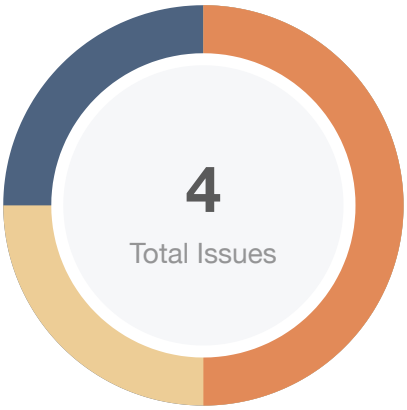
Vulnerability Summary

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

Audit Scope

ID	File	SHA256 Checksum
RSR	RevenueSharingPool.sol	6b854390d2caf6fbfa8bcdfedb8e88fe88d67a0144b0158047941161655ad841

Findings



Critical	0 (0.00%)
Major	2 (50.00%)
Medium	0 (0.00%)
Minor	1 (25.00%)
Informational	1 (25.00%)
Discussion	0 (0.00%)

ID	Title	Category	Severity	Status
RSR-01	Centralization Risk in `depositRevenue()`	**Centralization / Privilege**	**Major**	Acknowledged
RSR-02	`removeStakeholder()` not called in function `emergencyWithdraw()`	Logical Issue	Minor	Resolved
RSR-03	Reward token not trasferred to user in function `claimReward()`	Logical Issue	Major	Resolved
RSR-04	Local Variable Shadowing	Volatile Code	Informational	Acknowledged

RSR-01 | Centralization Risk in `depositRevenue()`

Category	Severity	Location	Status
Centralization / Privilege	Major	LuckyLion/contracts/RevenueSharingPool/RevenueSharingPool.sol (e97bf75): 164~177	Acknowledged

Description

In the contract `RevenueSharingPool`, the role `owner` has the authority over the following function:

- `updateMaxDate()`
- `addWhitelist()`
- `removeWhitelist()`
- `depositRevenue()`

The parameters of a revenue-sharing round are completely controlled by the whitelisted addresses through the privileged function `depositRevenue()`. This function allows the caller to create a new round of revenue sharing, which will prevent users to deposit to old sharing rounds.

```
1   function depositRevenue(
2         string memory symbol,
3         uint256 amount,
4         uint256 winLoss,
5         uint256 TPV,
6         uint256 percentOfRevshare
7     ) external isWhitelisted(msg.sender) {
8         uint256 roundId = getCurrentRoundId();
9         totalLuckyRevenue[roundId] += amount;
10        updatePoolInfo(winLoss, TPV, symbol, amount, percentOfRevshare, roundId); // update
round pool info
11        START_ROUND_DATE = block.timestamp;
12        updateRoundId();
13        uint256 currentRoundId = getCurrentRoundId();
14        updateTotalStake(currentRoundId); // update new round total stake
15        emit DistributeLuckyRevenue(msg.sender, address(this), amount);
16    }
```

Any compromise to the `owner` or `whitelisted` accounts may allow the hacker to take advantage of this and disrupt the operation of the pool. E.g., block a high APY revenue sharing round by calling `depositRevenue()`.

Recommendation

We advise the client to carefully manage the `owner` 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

[Lucky Lion Team]:

Acknowledge: This project has one owner. We have security to protect the private key and the seed of owner's wallet. We have announcement to the community before depositRevenue() every week. This case doesn't have any impact on the LP of users.

RSR-02 | `removeStakeholder()` not called in function `emergencyWithdraw()`

Category	Severity	Location	Status
Logical Issue	Minor	LuckyLion/contracts/RevenueSharingPool/RevenueSharingPool.sol (e97bf75): 120	Resolved

Description

Function `removeStakeholder()` is not called in `emergencyWithdraw`, which conflicts with the counterpart in function `withdrawToken()`

```
1   function withdrawToken() external {
2         ...
3         uint256 amount = user.amount;
4         user.amount = 0;
5         removeStake(roundId);
6         removeStakeholder(msg.sender);
7         luckyBusd.safeTransfer(msg.sender, amount);
8         emit WithdrawStake(msg.sender, amount, block.timestamp);
9     }
10
11  function emergencyWithdraw() external {
12        ...
13        uint256 amount = user.amount;
14        user.amount = 0;
15        user.lastUpdateRoundId = roundId;
16        removeStake(roundId);
17        luckyBusd.safeTransfer(msg.sender, amount);
18        emit WithdrawStake(msg.sender, amount, block.timestamp);
19    }
```

Recommendation

We recommend the client calling `removStakeHolder()` in function emergencyWithdraw() to keep consistent.

Alleviation

LuckyLion team has resolved this issue as suggested in commit `c87022db0fd23de93cc367edfa5cfdd676265ec9`

RSR-03 | Reward token not trasferred to user in function `claimReward()`

Category	Severity	Location	Status
Logical Issue	Major	LuckyLion/contracts/RevenueSharingPool/RevenueSharingPool.sol (e97bf75): 140	Resolved

Description

In the current implementation of function `claimReward()` there is no reward token transfer related funtion, which means users can not actually receive their reward by calling `claimReward()`.

```
126    function claimReward() external {
127          UserInfo storage user = userInfo[msg.sender];
128          uint256 roundId = getCurrentRoundId();
129
130          if (user.amount > 0) {
131              if (!isStakeUpToDate(roundId)) {
132                 updatePendingStake();
133              }
134              updatePendingReward();
135          }
136
137          uint256 claimableLuckyReward = user.pendingReward;
138          require(claimableLuckyReward > 0, "Not enough claimable LUCKY reward!");
139          user.rewardDept += claimableLuckyReward;
140          user.pendingReward -= claimableLuckyReward;
141          emit ClaimReward(msg.sender, claimableLuckyReward, block.timestamp);
142      }
```

Recommendation

We advise the team to explain explicitly how the reward tokens will be distributed to the user.

Alleviation

[Lucky Lion Team]:

Business logic: The revenue sharing pool pay the reward to users in form of Credit to play a game. When users claim rewards, the smart contract will sending the reward amount to Backend to generate Credit. Users can change the credit to Lucky token via Withdraw function in Game System.

RSR-04 | Local Variable Shadowing

Category	Severity	Location	Status
Volatile Code	Informational	LuckyLion/contracts/RevenueSharingPool/RevenueSharingPool.sol (e97bf75): 24	Acknowledged

Description

The linked variable `totalLuckyRevenue` shadows with `PoolInfo.totalLuckyRevenue`.

```
24  mapping(uint256 => uint256) public totalLuckyRevenue
```

```
40    struct PoolInfo {
41          uint256 winLoss;
42          uint256 TPV;
43          string symbol; // must be changes (waiting for P'Book to confirm with customer)
44          uint256 TVL;
45          uint256 percentOfRevshare;
46          uint256 participants;
47          uint256 totalLuckyRevenue;
48      }
```

Recommendation

Consider renaming the linked variables to avoid shadowing.

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.

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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