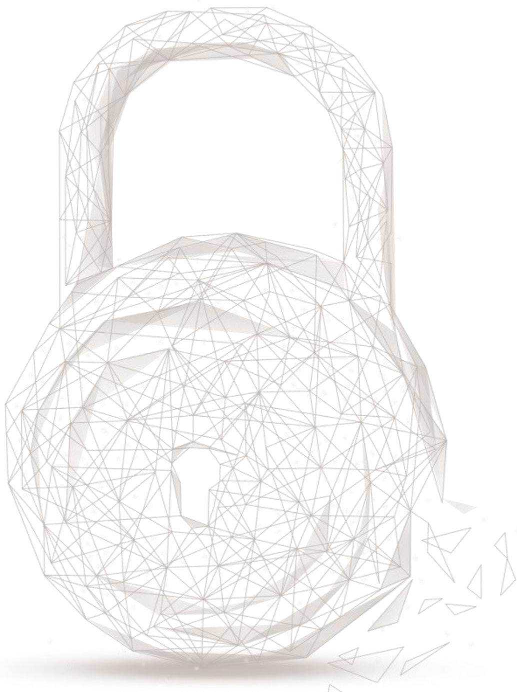
BEOSIN

Blockchain Security

# Smart contract security audit report



**Audit Number: 202110081700**

**Project Contract Name: huckleberry-farm**

**Project Deployment Platform: Ethereum**

**Github: https://github.com/HuckleberryDex/huckleberry-farm**

**Commit hash: 3f1995c70d5f9eb10077ccf62458019deed6f799**

**Audit Start Date: 2021.09.30**

**Audit Completion Date: 2021.10.08**

**Audit Result: Pass**

**Audit Team: Beosin Technology Co. Ltd.**

## Audit Results Explained

Beosin Technology has used several methods including Formal Verification, Static Analysis, Typical Case Testing and Manual Review to audit three major aspects of huckleberry-farm smart contracts, including Coding Standards, Security, and Business Logic. **After auditing, the huckleberry-farm project was found to have 1 risk: 1 Info. As of the completion of the audit, all risk items have been fixed or properly handled. The overall result of the huckleberry-farm smart contracts is Pass.** The following is the detailed audit information for this project.

| Index | Risk description | Risk level | Fix results |
|---|---|---|---|
| HuckleberryFarm-1 | *add* function design flaws | Info | Ignored |

Table 1. Risk Statistics

**Risk explained**

Item HuckleberryFarm-1 is not fixed and when the reward token and the staking token are the same, it may result in a loss of principal for the user.

# Risk descriptions and fix results explained

## [HuckleberryFarm-1 Info] *add* function design flaws

Description: The HuckleberryFarm contract uses balanceOf to obtain the user's staking when the reward is calculated, so the user may lose principal when the reward tokens and staking tokens are the same.

```
function pendingReward(uint256 _pid, address _user) external view returns (uint256) {
    PoolInfo storage pool = poolInfo[_pid];
    UserInfo storage user = userInfo[_pid][_user];
    uint256 accRewardPerShare = pool.accRewardPerShare;
    uint256 lpSupply = pool.lpToken.balanceOf(address(this));
    if (block.timestamp > pool.lastRewardTimestamp && lpSupply != 0) {
        uint256 multiplier = getMultiplier(pool.lastRewardTimestamp, block.timestamp);
        uint256 finnReward = multiplier.mul(finnPerSecond).mul(pool.allocPoint).div(totalAllocPoint);
        accRewardPerShare = accRewardPerShare.add(finnReward.mul(1e12).div(lpSupply));
    }
    return user.amount.mul(accRewardPerShare).div(1e12).sub(user.rewardDebt);
}
```

Figure 1 Source code of *pendingReward* function

```
// Add a new lp to the pool. Can only be called by the owner.
// XXX DO NOT add the same LP token more than once. Rewards will be messed up if you do.
function add(uint256 _allocPoint, IERC20 _lpToken, bool _withUpdate) public onlyOwner {
    if (_withUpdate) {
        massUpdatePools();
    }
    uint256 lastRewardTimestamp = block.timestamp > startTime ? block.timestamp : startTime;
    totalAllocPoint = totalAllocPoint.add(_allocPoint);
    poolInfo.push(PoolInfo({
        lpToken: _lpToken,
        allocPoint: _allocPoint,
        lastRewardTimestamp: lastRewardTimestamp,
        accRewardPerShare: 0
    }));
}
```

Figure 2 Source code of *add* function (Unfixed)

Fix recommendations: It is suggested to add a new judgment in the *add* function that the added lptoken cannot be the same as the finn address.

Fix results: Ignored.

## Other audit items explained

1. Basic Token Information

| | |
|---|---|
| Token name | FINN Token |
| Token symbol | FINN |
| decimals | 18 |
| totalSupply | Fill in after deployment (Constant amount) |
| Token type | ERC20 |

Table 2 – FINN Token Information

2. Other audit recommendations

- The reward token finn in the HuckleberryFarm contract is a deflationary bonus token, and the reward is pre-populated into this contract. It is recommended to set this contract as a bonus exception address to prevent the remaining rewards in the contract from being uncollected after allEndTime.

- There are two types of problems with this type of staking pool: first, there is no special treatment for inflation-deflation type tokens, and there is no check to see if the actual number of tokens transferred to the contract is the same as the number filled in when the function is called; second, the reward tokens are added as staking tokens, resulting in an exception in the reward calculation. The root cause of both types of problems still lies in the fact that the *balanceOf* function is used to obtain the staking amount when calculating the rewards.

- It is recommended to set the parameter _withUpdate to true when calling the *set* function.

# Appendix 1  Description of Vulnerability Level

| Vulnerability Level | Description | Example |
|---|---|---|
| **Critical** | Vulnerabilities that lead to the complete destruction of the project and cannot be recovered. It is strongly recommended to fix. | Malicious tampering of core contract privileges and theft of contract assets. |
| **High** | Vulnerabilities that lead to major abnormalities in the operation of the contract due to contract operation errors. It is strongly recommended to fix. | Unstandardized docking of the USDT interface, causing the user's assets to be unable to withdraw. |
| **Medium** | Vulnerabilities that cause the contract operation result to be inconsistent with the design but will not harm the core business. It is recommended to fix. | The rewards that users received do not match expectations. |
| **Low** | Vulnerabilities that have no impact on the operation of the contract, but there are potential security risks, which may affect other functions. The project party needs to confirm and determine whether the fix is needed according to the business scenario as appropriate. | Inaccurate annual interest rate data queries. |
| **Info** | There is no impact on the normal operation of the contract, but improvements are still recommended to comply with widely accepted common project specifications. | It is needed to trigger corresponding events after modifying the core configuration. |

# Appendix 2 Audit Categories and Details

| No. | Categories | Subitems |
| --- | --- | --- |
| 1 | Coding Conventions | Compiler Version Security |
| | | Deprecated Items |
| | | Redundant Code |
| | | require/assert Usage |
| | | Gas Consumption |
| 2 | General Vulnerability | Integer Overflow/Underflow |
| | | Reentrancy |
| | | Pseudo-random Number Generator (PRNG) |
| | | Transaction-Ordering Dependence |
| | | DoS (Denial of Service) |
| | | Function Call Permissions |
| | | call/delegatecall Security |
| | | Returned Value Security |
| | | tx.origin Usage |
| | | Replay Attack |
| | | Overriding Variables |
| 3 | Business Security | Business Logics |
| | | Business Implementations |

## 1. Coding Conventions

### 1.1. Compiler Version Security

The old version of the compiler may cause various known security issues. Developers are advised to specify the contract code to use the latest compiler version and eliminate the compiler alerts.

### 1.2. Deprecated Items

The Solidity smart contract development language is in rapid iteration. Some keywords have been deprecated by newer versions of the compiler, such as throw, years, etc. To eliminate the potential pitfalls they may cause, contract developers should not use the keywords that have been deprecated by the current compiler version.

### 1.3. Redundant Code

Redundant code in smart contracts can reduce code readability and may require more gas consumption for contract deployment. It is recommended to eliminate redundant code.

### 1.4. SafeMath Features

Check whether the functions within the SafeMath library are correctly used in the contract to perform mathematical operations, or perform other overflow prevention checks.

### 1.5. require/assert Usage

Solidity uses state recovery exceptions to handle errors. This mechanism will undo all changes made to the state in the current call (and all its subcalls) and flag the errors to the caller. The functions assert and require can be used to check conditions and throw exceptions when the conditions are not met. The assert function can only be used to test for internal errors and check non-variables. The require function is used to confirm the validity of conditions, such as whether the input variables or contract state variables meet the conditions, or to verify the return value of external contract calls.

### 1.6. Gas Consumption

The smart contract virtual machine needs gas to execute the contract code. When the gas is insufficient, the code execution will throw an out of gas exception and cancel all state changes. Contract developers are required to control the gas consumption of the code to avoid function execution failures due to insufficient gas.

### 1.7. Visibility Specifiers

Check whether the visibility conforms to design requirement.

### 1.8. Fallback Usage

Check whether the Fallback function has been used correctly in the current contract.

## 2. General Vulnerability

### 2.1. Integer overflow

Integer overflow is a security problem in many languages, and they are especially dangerous in smart contracts. Solidity can handle up to 256-bit numbers (2**256-1). If the maximum number is increased by 1, it will overflow to 0. Similarly, when the number is a uint type, 0 minus 1 will underflow to get the maximum number value. Overflow conditions can lead to incorrect results, especially if its possible results are not expected, which may affect the reliability and safety of the program. For the compiler version after Solidity 0.8.0, smart contracts will perform overflow checking on mathematical operations by default. In the previous compiler versions, developers need to add their own overflow checking code, and SafeMath library is recommended to use.

### 2.2. Reentrancy

The reentrancy vulnerability is the most typical Ethereum smart contract vulnerability, which has caused the DAO to be attacked. The risk of reentry attack exists when there is an error in the logical order of calling the call.value() function to send assets.

**2.3 Pseudo-random Number Generator (PRNG)**

Random numbers may be used in smart contracts. In solidity, it is common to use block information as a random factor to generate, but such use is insecure. Block information can be controlled by miners or obtained by attackers during transactions, and such random numbers are to some extent predictable or collidable.

**2.4. Transaction-Ordering Dependence**

In the process of transaction packing and execution, when faced with transactions of the same difficulty, miners tend to choose the one with higher gas cost to be packed first, so users can specify a higher gas cost to have their transactions packed and executed first.

**2.5. DoS(Denial of Service)**

DoS, or Denial of Service, can prevent the target from providing normal services. Due to the immutability of smart contracts, this type of attack can make it impossible to ever restore the contract to its normal working state. There are various reasons for the denial of service of a smart contract, including malicious revert when acting as the recipient of a transaction, gas exhaustion caused by code design flaws, etc.

**2.6. Function Call Permissions**

If smart contracts have high-privilege functions, such as coin minting, self-destruction, change owner, etc., permission restrictions on function calls are required to avoid security problems caused by permission leakage.

**2.7. call/delegatecall Security**

Solidity provides the call/delegatecall function for function calls, which can cause call injection vulnerability if not used properly. For example, the parameters of the call, if controllable, can control this contract to perform unauthorized operations or call dangerous functions of other contracts.

**2.8. Returned Value Security**

In Solidity, there are transfer(), send(), call.value() and other methods. The transaction will be rolled back if the transfer fails, while send and call.value will return false if the transfer fails. If the return is not correctly judged, the unanticipated logic may be executed. In addition, in the implementation of the transfer/transferFrom function of the token contract, it is also necessary to avoid the transfer failure and return false, so as not to create fake recharge loopholes.

**2.9. tx.origin Usage**

The tx.origin represents the address of the initial creator of the transaction. If tx.origin is used for permission judgment, errors may occur; in addition, if the contract needs to determine whether the caller is the contract address, then tx.origin should be used instead of extcodesize.

**2.10. Replay Attack**

A replay attack means that if two contracts use the same code implementation, and the identity authentication is in the transmission of parameters, the transaction information can be replayed to the other contract to execute the transaction when the user executes a transaction to one contract.

**2.11. Overriding Variables**

There are complex variable types in Solidity, such as structures, dynamic arrays, etc. When using a lower version of the compiler, improperly assigning values to it may result in overwriting the values of existing state variables, causing logical exceptions during contract execution.

## Appendix 3 Disclaimer

This report is made in response to the project code. No description, expression or wording in this report shall be construed as an endorsement, affirmation or confirmation of the project. This audit is only applied to the type of auditing specified in this report and the scope of given in the results table. Other unknown security vulnerabilities are beyond auditing responsibility. Beosin Technology only issues this report based on the attacks or vulnerabilities that already existed or occurred before the issuance of this report. For the emergence of new attacks or vulnerabilities that exist or occur in the future, Beosin Technology lacks the capability to judge its possible impact on the security status of smart contracts, thus taking no responsibility for them. The security audit analysis and other contents of this report are based solely on the documents and materials that the contract provider has provided to Beosin Technology before the issuance of this report, and the contract provider warrants that there are no missing, tampered, deleted; if the documents and materials provided by the contract provider are missing, tampered, deleted, concealed or reflected in a situation that is inconsistent with the actual situation, or if the documents and materials provided are changed after the issuance of this report, Beosin Technology assumes no responsibility for the resulting loss or adverse effects. The audit report issued by Beosin Technology is based on the documents and materials provided by the contract provider, and relies on the technology currently possessed by Beosin. Due to the technical limitations of any organization, this report conducted by Beosin still has the possibility that the entire risk cannot be completely detected. Beosin disclaims any liability for the resulting losses.

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