BEOSIN
Blockchain Security

Roselle

Smart Contract Security Audit

V1.0

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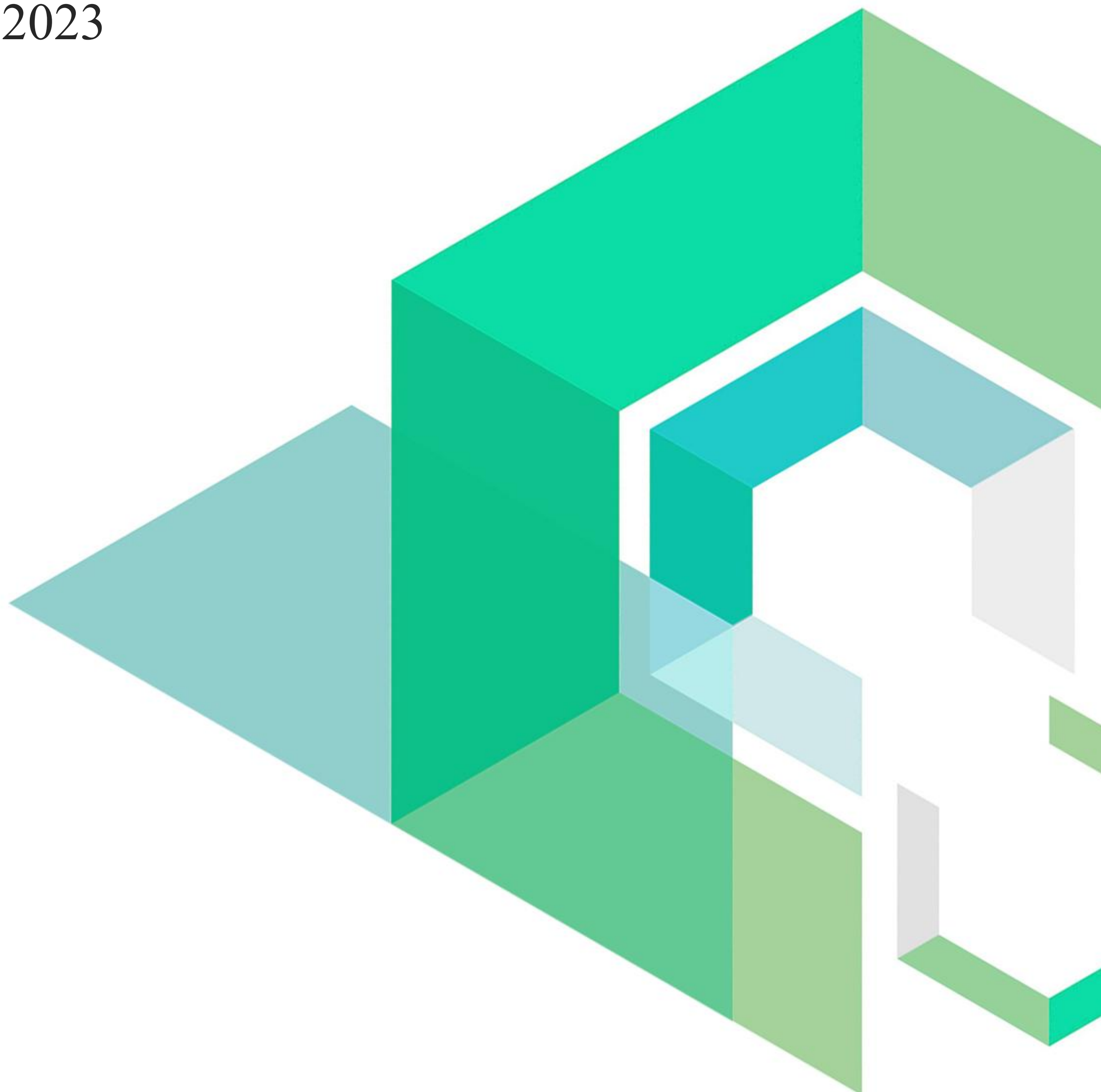
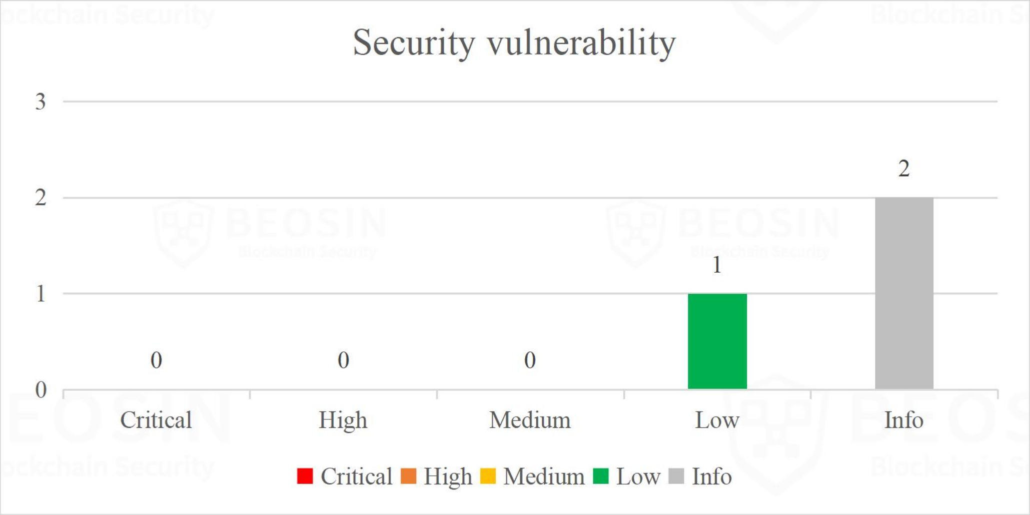
Jan 16th, 2023



Contents

Summary of Audit Results

After auditing, 1 Low and 2 Info-risk items were identified in the Roselle project. Specific audit details will be presented in the **Findings** section. Users should pay attention to the following aspects when interacting with this project:



***Notes:**

- **Risk Description:**

1. When the fee in the contract reaches the threshold and Roselle is TokenB in the pair, the transaction will fail when adding liquidity.

2. The event is not triggered when the owner modifies key parameters such as the handling fee.

- **Project Description:**

1. Business overview

Roselle is a deflationary token. Users will be charged various fees when trading: burn fee, liquidity fee, buy fee from pair, selling fee and basefee (buy fee, sell fee and base fee are stored in contract). When the fee reaches the threshold(specified by the owner), the contract will divide all the tokens in contract into two parts: first part (default 30%) will go to two steps, step one half of roselle token will be exchanged for rewardToken in the pair with rewardToken, and step two the another half of roselle token will be added to the pair as liquidity, and the LP tokens will be sent to address 0; the second part (default 70%) will be exchanged for rewardToken and send to dividendTracker address.

The RosRouter and RosFactory contracts implement a decentralized exchange where users can freely create trading pairs; add and remove liquidity; and exchange tokens(Handling fee is 0.3%).

2. Basic Token Information

Token name	Roselle
Token symbol	Roselle
Decimals	18
Pre-mint	2,100,000
Total supply	2,087,044 (Tokens that deflate with transactions)
Token type	FRC-20

1 Overview

1.1 Project Overview

Project Name	Roselle
Platform	FON Smart Chain
Contract address	0x5Df615972954257133d7A0d5fFD68CddD31033d2 (RosRouter) 0x232bF8d9cED464a75632657Cb2554880Acdcac1B (RosFactory) 0xf75f541F2B12F5647DeEa400957E1B8f7388a390 (Roselle)

1.2 Audit Overview

Audit work duration: Jan 12, 2023 – Jan 16, 2023

Audit methods: Formal Verification, Static Analysis, Typical Case Testing and Manual Review.

Audit team: Beosin Security Team.

2 Findings

Index	Risk description	Severity level	Status
Roselle-1	Adding liquidity may fail	Low	Acknowledged
Roselle-2	owner modifies key parameters without triggering an event	Info	Acknowledged
Roselle-3	Redundant codes	Info	Acknowledged

Status Notes:

Roselle-1 is not fixed and may cause failed to add liquidity.

Roselle-2 is not fixed and may not cause any issue.

Roselle-3 is not fixed and may not cause any issue.

Finding Details:

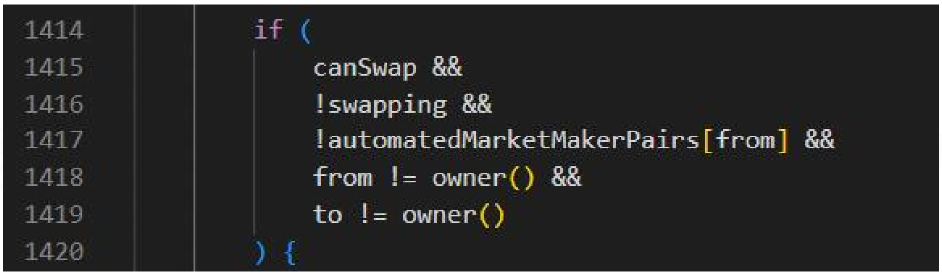
[Roselle-1] Adding liquidity may fail

Severity Level Low

Type Business Security

Lines Roselle.sol#L1414-1420

Description When liquidity is added and TokenB is Roselle, if the condition of *swapAndLiquify* is met. The user first sends TokenA to the contract. At this time, balanceA is greater than reserveA. When Roselle is sent to the contract, *swapAndLiquify* in Roselle will be triggered. Since a token exchange will be performed in *swapAndLiquify*, and the update function is called to update reserveA to balanceA. After *swapAndLiquify*, send Roselle to the pair, balanceB is greater than reserveB, and balanceA is equal to reserveA. At this time, the pair contract believes that the user has not sent TokenA, and the addition of liquidity fails.



```
1414        if (
1415            canSwap &&
1416            !swapping &&
1417            !automatedMarketMakerPairs[from] &&
1418            from != owner() &&
1419            to != owner()
1420        ) {
```

Figure 1 Source code of related functions

Recommendations It is recommended to add a judgment to the factory contract to ensure that Roselle transfer is first in the transaction pair.

Status Acknowledged.

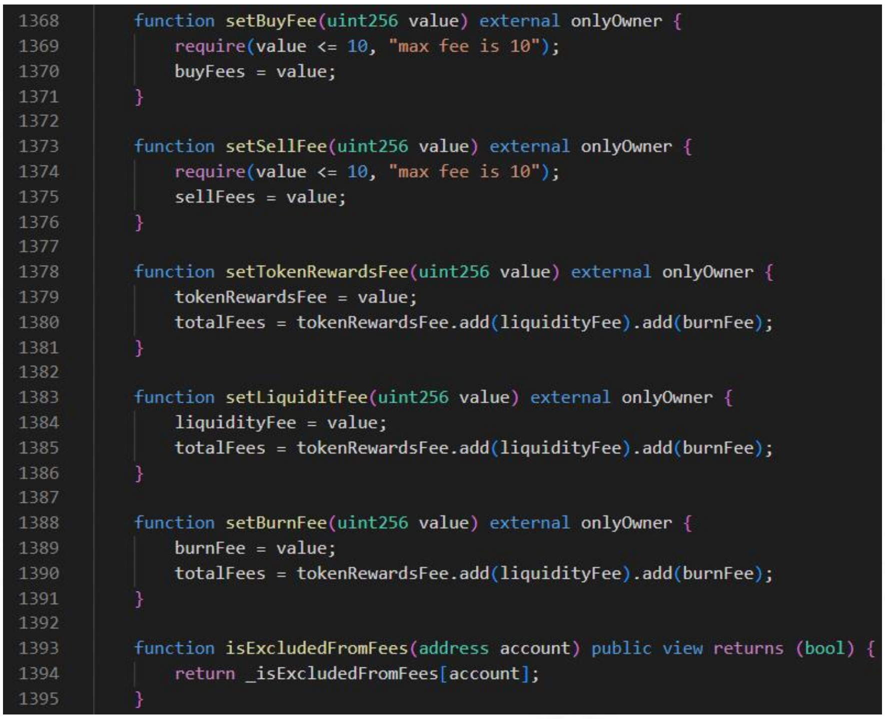
[Roselle-2] owner modifies key parameters without triggering an event

Severity Level Info

Type Business Security

Lines Roselle.sol#L1368-1395

Description The event is not triggered when the owner modifies key parameters such as the handling fee.



```
1368    function setBuyFee(uint256 value) external onlyOwner {
1369        require(value <= 10, "max fee is 10");
1370        buyFees = value;
1371    }
1372
1373    function setSellFee(uint256 value) external onlyOwner {
1374        require(value <= 10, "max fee is 10");
1375        sellFees = value;
1376    }
1377
1378    function setTokenRewardsFee(uint256 value) external onlyOwner {
1379        tokenRewardsFee = value;
1380        totalFees = tokenRewardsFee.add(liquidityFee).add(burnFee);
1381    }
1382
1383    function setLiquiditFee(uint256 value) external onlyOwner {
1384        liquidityFee = value;
1385        totalFees = tokenRewardsFee.add(liquidityFee).add(burnFee);
1386    }
1387
1388    function setBurnFee(uint256 value) external onlyOwner {
1389        burnFee = value;
1390        totalFees = tokenRewardsFee.add(liquidityFee).add(burnFee);
1391    }
1392
1393    function isExcludedFromFees(address account) public view returns (bool) {
1394        return _isExcludedFromFees[account];
1395    }
```

Figure 2 Source code of related functions

Recommendations It is recommended that new events should be added and triggered.

Status Acknowledged.

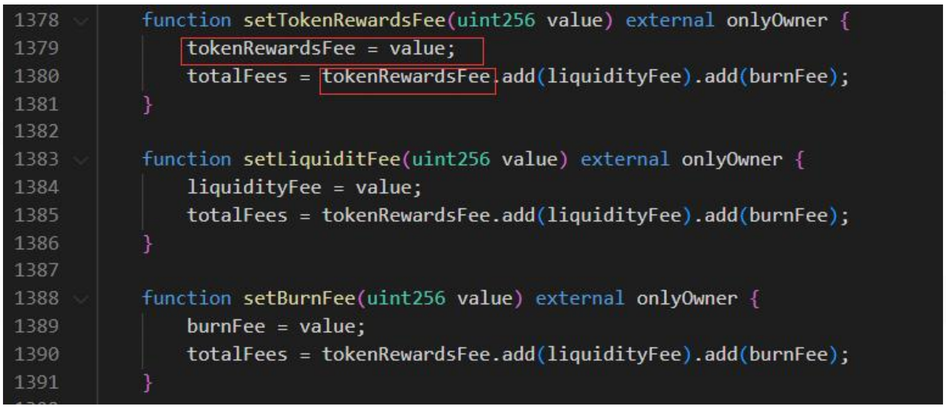
[Roselle-3] Redundant codes

Severity Level Info

Type Coding Conventions

Lines Roselle.sol#L1378-L1391

Description tokenRewardsFee is only used for calculating totalFees as the component of the denominator.



```
1378    function setTokenRewardsFee(uint256 value) external onlyOwner {
1379        tokenRewardsFee = value;
1380        totalFees = tokenRewardsFee.add(liquidityFee).add(burnFee);
1381    }
1382
1383    function setLiquiditFee(uint256 value) external onlyOwner {
1384        liquidityFee = value;
1385        totalFees = tokenRewardsFee.add(liquidityFee).add(burnFee);
1386    }
1387
1388    function setBurnFee(uint256 value) external onlyOwner {
1389        burnFee = value;
1390        totalFees = tokenRewardsFee.add(liquidityFee).add(burnFee);
1391    }
```

Figure 3 Source code of related functions

Recommendations If it is redundant code, it is recommended to delete.

Status Acknowledged.

3 Appendix

3.1 Vulnerability Assessment Metrics and Status in Smart Contracts

3.1.1 Metrics

In order to objectively assess the severity level of vulnerabilities in blockchain systems, this report provides detailed assessment metrics for security vulnerabilities in smart contracts with reference to CVSS 3.1 (Common Vulnerability Scoring System Ver 3.1).

According to the severity level of vulnerability, the vulnerabilities are classified into four levels: "critical", "high", "medium" and "low". It mainly relies on the degree of impact and likelihood of exploitation of the vulnerability, supplemented by other comprehensive factors to determine of the severity level.

Impact Likelihood	Severe	High	Medium	Low
Probable	Critical	High	Medium	Low
Possible	High	High	Medium	Low
Unlikely	Medium	Medium	Low	Info
Rare	Low	Low	Info	Info

3.1.2 Degree of impact

- **Severe**

Severe impact generally refers to the vulnerability can have a serious impact on the confidentiality, integrity, availability of smart contracts or their economic model, which can cause substantial economic losses to the contract business system, large-scale data disruption, loss of authority management, failure of key functions, loss of credibility, or indirectly affect the operation of other smart contracts associated with it and cause substantial losses, as well as other severe and mostly irreversible harm.

- **High**

High impact generally refers to the vulnerability can have a relatively serious impact on the confidentiality, integrity, availability of the smart contract or its economic model, which can cause a greater economic loss, local functional unavailability, loss of credibility and other impact to the contract business system.

- **Medium**

Medium impact generally refers to the vulnerability can have a relatively minor impact on the confidentiality, integrity, availability of the smart contract or its economic model, which can cause a small amount of economic loss to the contract business system, individual business unavailability and other impact.

- **Low**

Low impact generally refers to the vulnerability can have a minor impact on the smart contract, which can pose certain security threat to the contract business system and needs to be improved.

3.1.4 Likelihood of Exploitation

- **Probable**

Probable likelihood generally means that the cost required to exploit the vulnerability is low, with no special exploitation threshold, and the vulnerability can be triggered consistently.

- **Possible**

Possible likelihood generally means that exploiting such vulnerability requires a certain cost, or there are certain conditions for exploitation, and the vulnerability is not easily and consistently triggered.

- **Unlikely**

Unlikely likelihood generally means that the vulnerability requires a high cost, or the exploitation conditions are very demanding and the vulnerability is highly difficult to trigger.

- **Rare**

Rare likelihood generally means that the vulnerability requires an extremely high cost or the conditions for exploitation are extremely difficult to achieve.

3.1.5 Fix Results Status

Status	Description
Fixed	The project party fully fixes a vulnerability.
Partially Fixed	The project party did not fully fix the issue, but only mitigated the issue.
Acknowledged	The project party confirms and chooses to ignore the issue.

3.2 Audit Categories

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
		Third-party Protocol Interface Consistency
3	Business Security	Business Logics
		Business Implementations
		Manipulable Token Price
		Centralized Asset Control
		Asset Tradability
		Arbitrage Attack

Beosin classified the security issues of smart contracts into three categories: Coding Conventions, General Vulnerability, Business Security. Their specific definitions are as follows:

- **Coding Conventions**

Audit whether smart contracts follow recommended language security coding practices. For example, smart contracts developed in Solidity language should fix the compiler version and do not use deprecated keywords.

- **General Vulnerability**

General Vulnerability include some common vulnerabilities that may appear in smart contract projects. These vulnerabilities are mainly related to the characteristics of the smart contract itself, such as integer overflow/underflow and denial of service attacks.

- **Business Security**

Business security is mainly related to some issues related to the business realized by each project, and has a relatively strong pertinence. For example, whether the lock-up plan in the code match the white paper, or the flash loan attack caused by the incorrect setting of the price acquisition oracle.

*Note that the project may suffer stake losses due to the integrated third-party protocol. This is not something Beosin can control. Business security requires the participation of the project party. The project party and users need to stay vigilant at all times.

3.3 Disclaimer

The Audit Report issued by Beosin is related to the services agreed in the relevant service agreement. The Project Party or the Served Party (hereinafter referred to as the "Served Party") can only be used within the conditions and scope agreed in the service agreement. Other third parties shall not transmit, disclose, quote, rely on or tamper with the Audit Report issued for any purpose.

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The Audit Report issued by Beosin in no way provides investment advice on any project, nor should it be utilized as investment suggestions of any type. This report represents an extensive evaluation process designed to help our customers improve code quality while mitigating the high risks in blockchain.

3.4 About Beosin

Beosin is the first institution in the world specializing in the construction of blockchain security ecosystem. The core team members are all professors, postdocs, PhDs, and Internet elites from world-renowned academic institutions. Beosin has more than 20 years of research in formal verification technology, trusted computing, mobile security and kernel security, with overseas experience in studying and collaborating in project research at well-known universities. Through the security audit and defense deployment of more than 2,000 smart contracts, over 50 public blockchains and wallets, and nearly 100 exchanges worldwide, Beosin has accumulated rich experience in security attack and defense of the blockchain field, and has developed several security products specifically for blockchain.

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