Smart Contract Audit Report

Iotabee Smart Contract

9 Nov 2022

Numen Cyber Labs - Security Services

Table of Content

1 Executive Summary

Numen Cyber Technology was engaged by Iotabee to review smart contract implementation. The assessment was conducted in accordance with our systematic approach to evaluate potential security issues based upon customer requirement. The report provides detailed recommendations to resolve the issue and provide additional suggestions or recommendations for improvement.

Setting fees when creating new trading pairs can cause problems, resulting in high exchange fees. Missing a function to set an illegal transaction fee.

The outcome of the assessment outlined in chapter 3 provides the system's owners a full description of the vulnerabilities identified, the associated risk rating for each vulnerability, and detailed recommendations that will resolve the underlying technical issue.

Methodology

To standardize the evaluation, we define the following terminology based on OWASP Risk Rating Methodology [10] which is the gold standard in risk assessment using the following risk models:

- Likelihood: represents how likely a particular vulnerability is to be uncovered and exploited in the wild.
- Impact: measures the technical loss and business damage of a successful attack.
- Severity: determine the overall criticality of the risk.

Likelihood and impact are categorized into three ratings: High, Medium and Low. Severity is determined by likelihood and impact and can be classified into four categories accordingly, Critical, High, Medium, Low shown in table 1.1.

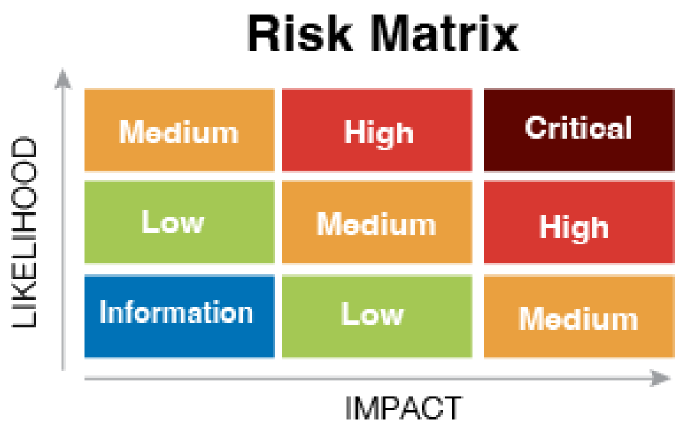


Table 1.1: Overall Risk Severity

To evaluate the risk, we will be going through a list of items, and each would be labelled with a severity category. The audit was performed with a systematic approach guided by a comprehensive assessment list carefully designed to identify known and impactful security issues. If our tool or analysis does not identify any issue, the contract can be considered safe regarding the assessed item. For any discovered issue, we might further deploy contracts on our private test environment and run tests to confirm the findings. If necessary, we would additionally build a PoC to demonstrate the possibility of exploitation. The concrete list of check items is shown in Table 1.2.

- Basic Coding Bugs: We first statically analyze given smart contracts with our proprietary static code analyzer for known coding bugs, and then manually verify (reject or confirm) all the issues found by our tool.

- Code and business security testing: We further review business logics, examine system operations, and place DeFi-related aspects under scrutiny to uncover possible pitfalls and/or bugs.

- Additional Recommendations: We also provide additional suggestions regarding the coding and development of smart contracts from the perspective of proven programming practices.

Category	**Assessment Item**

Basic Coding Assessment	Apply Verification Control
	Authorization Access Control
	Forged Transfer Vulnerability
	Forged Transfer Notification
	Numeric Overflow
	Transaction Rollback Attack
	Transaction Block Stuffing Attack
	Soft fail Attack
	Hard fail Attack
	Abnormal Memo
	Abnormal Resource Consumption
	Secure Random Number
Advanced Source Code Scrutiny	Asset Security
	Cryptography Security
	Business Logic Review
	Source Code Functional Verification
	Account Authorization Control
	Sensitive Information Disclosure
	Circuit Breaker
	Blacklist Control

	System API Call Analysis
	Contract Deployment Consistency Check
Additional Recommendations	Semantic Consistency Checks
	Following Other Best Practices

Table 1.2: The Full List of Assessment Items

To better describe each issue we identified, we categorize the findings with Common Weakness Enumeration (CWE-699) [14], which is a community-developed list of software weakness types to better delineate and organize weaknesses around concepts frequently encountered in software development.

2 FINDINGS OVERVIEW

2.1 Project Info and Contract address

Project Name: Iotabee

Project URL: https://iotabee.com/

Audit Time: 2022/11.7 - 2022/11.9

Language: solidity

Source Code Link	**Commit Hash**
https://github.com/iotabee/swap	a61a891f8841bb46ae930778df489b79ebe6a50f

2.2 Summary

Severity	**Found**	
Critical	0	
High	0	
Medium	0	
Low	2	🟩 🟩
Informational	0	

2.3 Key Findings

Two low-risk questions about setting fees.

ID	**Severity**	**Findings Title**	**Status**	**Confirm**

NVE-001	Low	When creating a new trading pair contract, using the wrong feeRateAmount will result in high transaction fees.	Ignore	Confirmed
NVE-002	Low	There is currently no processing for the deprecated fee block.	Fixed	Confirmed

Table 2.1: Key Audit Findings

3 Detailed Description of Findings

3.1 TRANSACTION PAIR FEE SETTING PROBLEM

ID: NVE-001

Location: IotaBeeSwapFactory.sol

Severity: Low

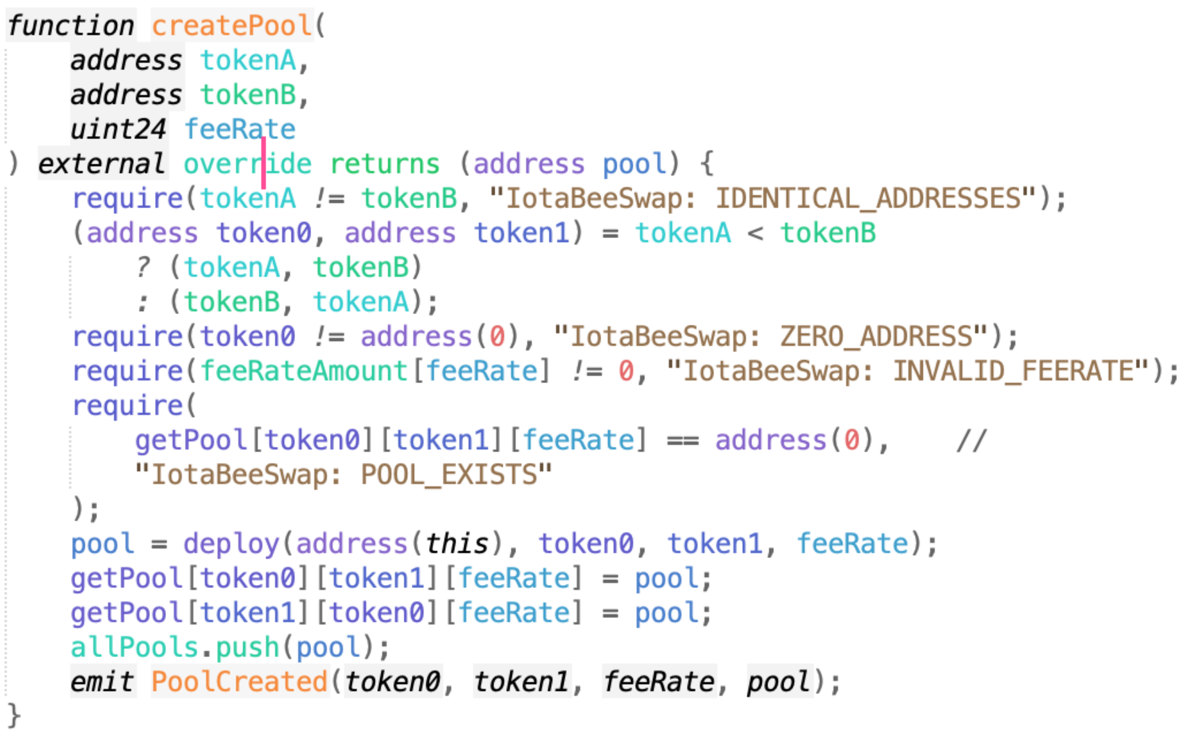
Category: Business Issues

Likelihood: Low

Impact: Low

Description:

Anyone can create a new trading pair contract. The project uses a mapping to record the handling fee, the key is the handling fee, and the value is 1 or 0 to indicate whether the handling fee is available. When creating a new trading pair, you need to set a fee, and an excessively high fee will make the transaction expensive(The transaction fee can be adjusted to 100%) .



```
function createPool(
    address tokenA,
    address tokenB,
    uint24 feeRate
) external override returns (address pool) {
    require(tokenA != tokenB, "IotaBeeSwap: IDENTICAL_ADDRESSES");
    (address token0, address token1) = tokenA < tokenB
        ? (tokenA, tokenB)
        : (tokenB, tokenA);
    require(token0 != address(0), "IotaBeeSwap: ZERO_ADDRESS");
    require(feeRateAmount[feeRate] != 0, "IotaBeeSwap: INVALID_FEERATE");
    require(
        getPool[token0][token1][feeRate] == address(0),    //
        "IotaBeeSwap: POOL_EXISTS"
    );
    pool = deploy(address(this), token0, token1, feeRate);
    getPool[token0][token1][feeRate] = pool;
    getPool[token1][token0][feeRate] = pool;
    allPools.push(pool);
    emit PoolCreated(token0, token1, feeRate, pool);
}
```

Figure 1 createPool function

Recommendations:

Because everyone can create a new transaction pair contract, and the service charge of the transaction pair contract is passed in by external parameters rather than fixed, you should pay attention when creating a new transaction pair contract.

Result: Pass

Fix Result:

Ignore (After communicating with the project party, this option will be highlighted on the front-end marking the handling fee).

3.2 Code logic flaws cause overflow

ID: NVE-002

Location: IotaBeeSwapFactory.sol

Severity: Low

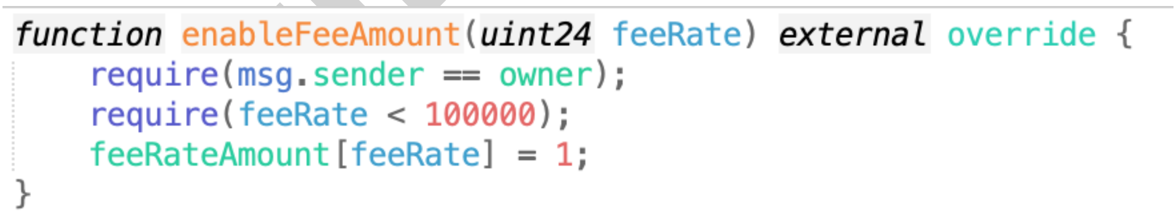
Category: Business Issues

Likelihood: Low

Impact: Low

Description:

Currently, there is no change in the status of the fee for the deprecated fee bracket, which will affect the management in the later stage of the project. For the renewal fee that is no longer used, the status should be changed in time.



```
function enableFeeAmount(uint24 feeRate) external override {
    require(msg.sender == owner);
    require(feeRate < 100000);
    feeRateAmount[feeRate] = 1;
}
```

Figure 2 enableFeeAmount function

Recommendations:

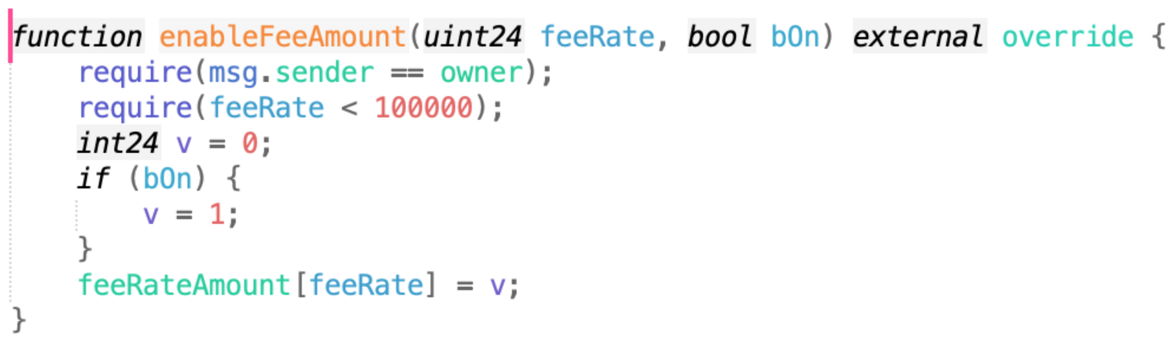
It is recommended that the function enableFeeAmount set an additional parameter of type bool. If it is true, change the value corresponding to the handling fee in the mapping to 1. If it is false, change it to 0 to change the handling fee status.

Result: Pass

Fix Result:

Fixed

The fixed code is as follows:



```
function enableFeeAmount(uint24 feeRate, bool bOn) external override {
    require(msg.sender == owner);
    require(feeRate < 100000);
    int24 v = 0;
    if (bOn) {
        v = 1;
    }
    feeRateAmount[feeRate] = v;
}
```

Figure 3 enableFeeAmount function

4 CONCLUSION

In this audit, we thoroughly analyzed **Iotabee**’s smart contract implementation. The problems found are described and explained in detail in Section 3. The problems found in the audit have been brought up to the project party, ignored issues are in line with the project design, and permissions are only used for the project to properly function. We therefore deem the audit result to be a **PASS.** To improve this report, we greatly appreciate any constructive feedbacks or suggestions, on our methodology, audit findings, or potential gaps in scope/coverage.

5 Appendix

5.1 Basic Coding Assessment

5.1.1 Apply Verification Control

- Description: The security of apply verification
- Result: Not found
- Severity: Critical

5.1.2 Authorization Access Control

- Description: Permission checks for external integral functions
- Result: Not found
- Severity: Critical

5.1.3 Forged Transfer Vulnerability

- Description: Assess whether there is a forged transfer notification vulnerability in the contract
- Result: Not found
- Severity: Critical

5.1.4 Transaction Rollback Attack

- Description: Assess whether there is transaction rollback attack vulnerability in the contract.
- Result: Not found
- Severity: Critical

5.1.5 Transaction Block Stuffing Attack

- Description: Assess whether there is transaction blocking attack vulnerability.
- Result: Not found
- Severity: Critical

5.1.6 soft fail Attack Assessment

- Description: Assess whether there is soft fail attack vulnerability.
- Result: Not found
- Severity: Critical

5.1.7 hard fail Attack Assessment

- Description: Examine for hard fail attack vulnerability
- Result: Not found
- Severity: Critical

5.1.8 Abnormal Memo Assessment

- Description: Assess whether there is abnormal memo vulnerability in the contract.
- Result: Not found
- Severity: Critical

5.1.9 Abnormal Resource Consumption

- Description: Examine whether abnormal resource consumption in contract processing.
- Result: Not found
- Severity: Critical

5.1.10 Random Number Security

- Description: Examine whether the code uses insecure random number.
- Result: Not found
- Severity: Critical

5.2 Advanced Code Scrutiny

5.2.1 Cryptography Security

- Description: Examine for weakness in cryptograph implementation.
- Results: Not Found
- Severity: High

5.2.2 Account Permission Control

- Description: Examine permission control issue in the contract
- Results: Not Found
- Severity: Medium

5.2.3 Malicious Code Behaviour

- Description: Examine whether sensitive behaviour present in the code
- Results: Not found
- Severity: Medium

5.2.4 Sensitive Information Disclosure

- Description: Examine whether sensitive information disclosure issue present in the code.
- Result: Not found
- Severity: Medium

5.2.5 System API

- Description: Examine whether system API application issue present in the code

- Results: Not found
- Severity: Low

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This report should not be used in any way to make decisions around investment or involvement with any particular project. This report in no way provides investment advice, nor should be leveraged as investment advice of any sort. This report represents an extensive assessing process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology.

Blockchain technology and cryptographic assets present a high level of ongoing risk. Numen's position is that each company and individual are responsible for their own due diligence and continuous security. Numen's goal is to help reduce the attack vectors and the high level of variance associated with utilizing new and consistently changing technologies, and in no way claims any guarantee of security or functionality of the technology we agree to analyze.

References

[1] MITRE. CWE- 191: Integer Underflow (Wrap or Wraparound).
https://cwe.mitre.org/data/ definitions/191.html.

[2] MITRE. CWE- 197: Numeric Truncation Error.
https://cwe.mitre.org/data/definitions/197. html.

[3] MITRE. CWE-400: Uncontrolled Resource Consumption.
https://cwe.mitre.org/data/ definitions/400.html.

[4] MITRE. CWE-440: Expected Behavior Violation.
https://cwe.mitre.org/data/definitions/440. html.

[5] MITRE. CWE-684: Protection Mechanism Failure.
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[6] MITRE. CWE CATEGORY: 7PK - Security Features.
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[9] MITRE. CWE CATEGORY: Resource Management Errors.
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[10] OWASP. Risk Rating Methodology.
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