EXVUL

SMART CONTRACT AUDIT REPORT

Fluxion Smart Contract

NOVEMBER 2025

Contents

1. EXECUTIVE SUMMARY

ExVul Web3 Security was engaged by **Fluxion** 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.

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.

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

Likelihood \ IMPACT	Informational	Low	Medium	High
High	INFO	MEDIUM	HIGH	CRITICAL
Medium	INFO	LOW	MEDIUM	HIGH
Low	INFO	LOW	LOW	MEDIUM

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 • Abnormal Resource Consumption
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	Audit Time	Language
Fluxion	24/11/2025 - 27/11/2025	Solidity

Repository
https://github.com/BoothVeblen/Fluxion-Contract

Commit Hash
63d87bb518bfea04180f3517199bd9dbe134050c

2.2 Summary

Severity	Found
CRITICAL	0
HIGH	1
MEDIUM	1
LOW	2
INFO	1

2.3 Key Findings

Severity	Findings Title	Status
HIGH	Insolvency due to incorrect fee accounting	Fixed
MEDIUM	Old data not synchronized and updated status	Acknowledge
LOW	Missing zero address check in PoolFactory setters	Fixed
LOW	Inconsistency between documentation and code implementation	Fixed
INFO	Missing setTeamFee Functionality	Fixed

Table 2.3: Key Audit Findings

3. DETAILED DESCRIPTION OF FINDINGS

3.1 Insolvency due to incorrect fee accounting

SEVERITY: HIGH **STATUS:** Fixed

PATH:

`contracts/Pool.sol`

DESCRIPTION:

The _update0 and _update1 functions incorrectly include the team fee in the global LP reward index (index0/index1). While team fees are transferred directly to the team, they are also added to the LP's claimable amount. This mismatch between recorded rewards and actual funds in the PoolFees contract guarantees insolvency.

```
// contracts/Pool.sol
    function _update0(uint256 amountToPoolFees, uint256 amountToTeam)
   internal {
        // [...]
        IERC20(token0).safeTransfer(poolFees, amountToPoolFees); //
   transfer the fees out to PoolFees
        IERC20(token0).safeTransfer(IPoolFactory(factory).team(),
   amountToTeam); // transfer the fees out to Team
        uint256 _ratio = ((amountToPoolFees + amountToTeam) * 1e18) /
   totalSupply(); // 1e18 adjustment is removed during claim
        if (_ratio > 0) {
            index0 += _ratio;
        }
        emit Fees(_msgSender(), amountToPoolFees, 0, amountToTeam, 0);
    }
```

IMPACT:

LPs are credited with rewards (LP fee + Team fee) that exceed the PoolFees contract's balance (only LP fee). When LPs attempt to claim fees, the contract will run out of funds, causing transactions to revert and leaving LPs unable to withdraw their earnings.

RECOMMENDATIONS:

Exclude amountToTeam from the _ratio calculation.

```
// contracts/Pool.sol
    function _update0(uint256 amountToPoolFees, uint256 amountToTeam)
    internal {
        // [...]
        IERC20(token0).safeTransfer(poolFees, amountToPoolFees); //
    transfer the fees out to PoolFees
        IERC20(token0).safeTransfer(IPoolFactory(factory).team(),
    amountToTeam); // transfer the fees out to Team
-       uint256 _ratio = ((amountToPoolFees + amountToTeam) * 1e18) /
    totalSupply(); // 1e18 adjustment is removed during claim
+       uint256 _ratio = (amountToPoolFees * 1e18) / totalSupply(); //
    1e18 adjustment is removed during claim
        if (_ratio > 0) {
            index0 += _ratio;
        }
        emit Fees(_msgSender(), amountToPoolFees, 0, amountToTeam, 0);
    }
// contracts/Pool.sol
    function _update1(uint256 amountToPoolFees, uint256 amountToTeam)
    internal {
        // [...]
        IERC20(token1).safeTransfer(poolFees, amountToPoolFees);
        IERC20(token1).safeTransfer(IPoolFactory(factory).team(),
    amountToTeam);
-       uint256 _ratio = ((amountToPoolFees + amountToTeam) * 1e18) /
    totalSupply();
+       uint256 _ratio = (amountToPoolFees * 1e18) / totalSupply();
        if (_ratio > 0) {
            index1 += _ratio;
        }
        emit Fees(_msgSender(), 0, amountToPoolFees, 0, amountToTeam);
    }
```

3.2 Old data not synchronized and updated status

SEVERITY: MEDIUM **STATUS:** Acknowledge

PATH:

`contracts/factories/PoolFactory.sol, contracts/Pool.sol, contracts/PoolFeesUpgradeable.sol`

DESCRIPTION:

The PoolFactory contract allows updates via calls to setVoter/setUpgrader. However, this only guarantees updates for future Pools and PoolFees using new data; already created Pools are not updated synchronously. When initializing a Pool, need to set IPoolFactory(factory).voter(). PoolFeesUpgradeable requires an upgrader as its owner.

```
    /// @inheritdoc IPoolFactory
    function setVoter(address _voter) external {
        if (msg.sender != voter) revert NotVoter();
        voter = _voter;
        emit SetVoter(_voter);
    }

    function setUpgrader(address _upgrader) external {
        if (msg.sender != upgrader) revert NotUpgrader();
        upgrader = _upgrader;
        emit SetUpgrader(_upgrader);
    }
```

IMPACT:

Unsynchronized updates can lead to inconsistent pool management permissions, potentially resulting in the theft of old permissions and causing governance chaos.

RECOMMENDATIONS:

Add the ability to synchronize and update old data, such as the voter for Pool.sol and the Ownership

for PoolFeesUpgradeable.sol, to ensure that project management permissions are synchronized.

3.3 Missing zero address check in PoolFactory setters

SEVERITY: LOW **STATUS:** Fixed

PATH:

`contracts/factories/PoolFactory.sol`

DESCRIPTION:

The setVoter, setTeam, and setUpgrader functions in contracts/factories/PoolFactory.sol lack a check for the zero address (address(0)). This could lead to critical roles being accidentally burned if set incorrectly.

```
// contracts/factories/PoolFactory.sol
    function setVoter(address _voter) external {
        if (msg.sender != voter) revert NotVoter();
        voter = _voter;
        emit SetVoter(_voter);
    }

    function setTeam(address _team) external {
        if (msg.sender != team) revert NotTeam();
        team = _team;
        emit SetTeam(_team);
    }

    function setUpgrader(address _upgrader) external {
        if (msg.sender != upgrader) revert NotUpgrader();
        upgrader = _upgrader;
        emit SetUpgrader(_upgrader);
    }
```

IMPACT:

If these roles are set to address(0) by mistake, the corresponding administrative functions (like upgrading PoolFees or receiving team fees) will become permanently inaccessible or broken.

RECOMMENDATIONS:

Add a zero address check to these setter functions.

3.4 Inconsistency between documentation and code implementation

SEVERITY: LOW **STATUS:** Fixed

PATH:

`contracts/interfaces/IPool.sol, contracts/Pool.sol`

DESCRIPTION:

The comments in the interface IPool.sol file indicate that setName and setSymbol need to be called by Voter.emergencyCouncil().

```
    /// @notice Set pool name
    ///         Only callable by Voter.emergencyCouncil()
    /// @param __name String of new name
    function setName(string calldata __name) external;

    /// @notice Set pool symbol
    ///         Only callable by Voter.emergencyCouncil()
    /// @param __symbol String of new symbol
    function setSymbol(string calldata __symbol) external;
```

However, the actual code checks if msg.sender != IPoolFactory(factory).team(), which is inconsistent with the documentation.

```
    /// @inheritdoc IPool
    function setName(string calldata __name) external {
        if (msg.sender != IPoolFactory(factory).team()) revert NotTeam();
        _name = __name;
    }

    /// @inheritdoc IPool
    function setSymbol(string calldata __symbol) external {
        if (msg.sender != IPoolFactory(factory).team()) revert NotTeam();
        _symbol = __symbol;
    }
```

IMPACT:

Deviations may occur during later stages of operation, affecting the normal operation of the project.

RECOMMENDATIONS:

Modify the documentation comments or code according to the actual needs of the project, ensuring consistency and compliance with project expectations.

3.5 Missing setTeamFee Functionality

SEVERITY: INFO **STATUS:** Fixed

PATH:

`contracts/factories/PoolFactory.sol`

DESCRIPTION:

The relevant TeamFee is set in PoolFactory, but a modification function is missing, causing TeamFee to be permanently fixed.

IMPACT:

Once the contract is deployed, TeamFee will no longer be able to modify it.

RECOMMENDATIONS:

Add a function similar to setFee, setTeamFee.

4. CONCLUSION

In this audit, we thoroughly analyzed **Fluxion** smart contract implementation. The problems found are described and explained in detail in Section 3. The problems found in the audit have been communicated to the project leader. We therefore consider the audit result to be **PASSED**.

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
Result	Not found
Severity	HIGH

5.2.2 Account Permission Control

Description	Examine permission control issue in the contract
Result	Not found
Severity	MEDIUM

5.2.3 Malicious Code Behavior

Description	Examine whether sensitive behavior present in the code
Result	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
Result	Not found
Severity	LOW

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Blockchain technology and cryptographic assets present a high level of ongoing risk. ExVul's position is that each company and individual are responsible for their own due diligence and continuous security. ExVul'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.

7. 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. https://cwe.mitre.org/data/definitions/693.html.

[6] MITRE. CWE CATEGORY: 7PK - Security Features. https://cwe.mitre.org/data/definitions/254.html.

[7] MITRE. CWE CATEGORY: Behavioral Problems. https://cwe.mitre.org/data/definitions/438.html.

[8] MITRE. CWE CATEGORY: Numeric Errors. https://cwe.mitre.org/data/definitions/189.html.

[9] MITRE. CWE CATEGORY: Resource Management Errors. https://cwe.mitre.org/data/definitions/399.html.

[10] OWASP. Risk Rating Methodology. https://www.owasp.org/index.php/OWASP_Risk_Rating_Methodology

8. About Exvul Security

Premier Security for the Web3 Ecosystem

ExVul is a premier Web3 security firm committed to forging a secure and trustworthy decentralized ecosystem. Our elite team consists of security veterans from world-leading technology and blockchain security firms, including Huawei, YBB Captical, Qihoo 360, Amber, ByteDance, MoveBit, and PeckShield. Team member Nolan is ranked as a top-40 whitehat on Immunefi and is the platform's sole All-Star in the APAC region.

Our expertise covers the full spectrum of Web3 security. We conduct **meticulous smart contract audits**, having fortified thousands of projects on chains like Evm, Solana, Aptos, Sui etc. Our **Blockchain Protocol Audits** secure the core infrastructure of L1/L2 by uncovering deep-seated vulnerabilities. We also offer **comprehensive wallet audits** to protect user assets and provide **proactive web3 pentest**, enabling partners to neutralize threats before they strike.

Trusted by industry leaders, ExVul is the security partner for **OKX, Bitget, Cobo, Infini, Stacks, Aptos, Sui, CoreDAO, Sei** etc.

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