expelee

Building the Futuristic Blockchain Ecosystem

SECURITY AUDIT REPORT

MASTERCHEF

TOKEN OVERVIEW

Risk Findings

Severity	Found
🔴 High	2
🟠 Medium	2
🟡 Low	0
🔵 Informational	0

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OVERVIEW

The Expelee team has performed a line-by-line manual analysis and automated review of the smart contract. The smart contract was analysed mainly for common smart contract vulnerabilities, exploits, and manipulation hacks. According to the smart contract audit:

Audit Result	Passed
KYC Verification	No
Audit Date	8 June 2023

CONTRACT DETAILS

Token Name: MasterChef

Symbol: MasterChef

Network: Binance smart chain

Contract Type: Staking contract

Language: Solidity

Contract Address:
x88E7892d5aE5fCc8AA3A28E2B5482A55176c2Ced

Total Supply: ---

Checksum:
940027aab626d6ebcd2e991568e0f2131dc0b68d

Owner's Wallet:
0x3166Dfd7cFb2F66e9Fc6188955b29D9F1c35A679

Deployer's Wallet:
0x3166Dfd7cFb2F66e9Fc6188955b29D9F1c35A679

AUDIT METHODOLOGY

Audit Details

Our comprehensive audit report provides a full overview of the audited system's architecture, smart contract codebase, and details on any vulnerabilities found within the system.

Audit Goals

The audit goal is to ensure that the project is built to protect investors and users, preventing potentially catastrophic vulnerabilities after launch , that lead to scams and rugpulls.

Code Quality

Our analysis includes both automatic tests and manual code analysis for the following aspects:

- Exploits
- Back-doors
- Vulnerability
- Accuracy
- Readability

Tools

- DE
- Open Zeppelin
- Code Analyzer
- Solidity Code
- Compiler
- Hardhat

VULNERABILITY CHECKS

Design Logic	Passed
Compiler warnings	Passed
Private user data leaks	Passed
Timestamps dependence	Passed
Integer overflow and underflow	Passed
Race conditions & reentrancy. Cross-function race conditions	Passed
Possible delays in data delivery	Passed
Oracle calls	Passed
Front Running	Passed
DoS with Revert	Passed
DoS with block gas limit	Passed
Methods execution permissions	Passed
Economy model	Passed
Impact of the exchange rate on the logic	Passed
Malicious event log	Passed
Scoping and declarations	Passed
Uninitialized storage pointers	Passed
Arithmetic accuracy	Passed
Cross-function race conditions	Passed
Safe Zepplin module	Passed

RISK CLASSIFICATION

When performing smart contract audits, our specialists look for known vulnerabilities as well as logical and acces control issues within the code. The exploitation of these issues by malicious actors may cause serious financial damage to projects that failed to get an audit in time. We categorize these vulnerabilities by the following levels:

High Risk

Issues on this level are critical to the smart contract's performance/functionality and should be fixed before moving to a live environment.

Medium Risk

Issues on this level are critical to the smart contract's performance/functionality and should be fixed before moving to a live environment.

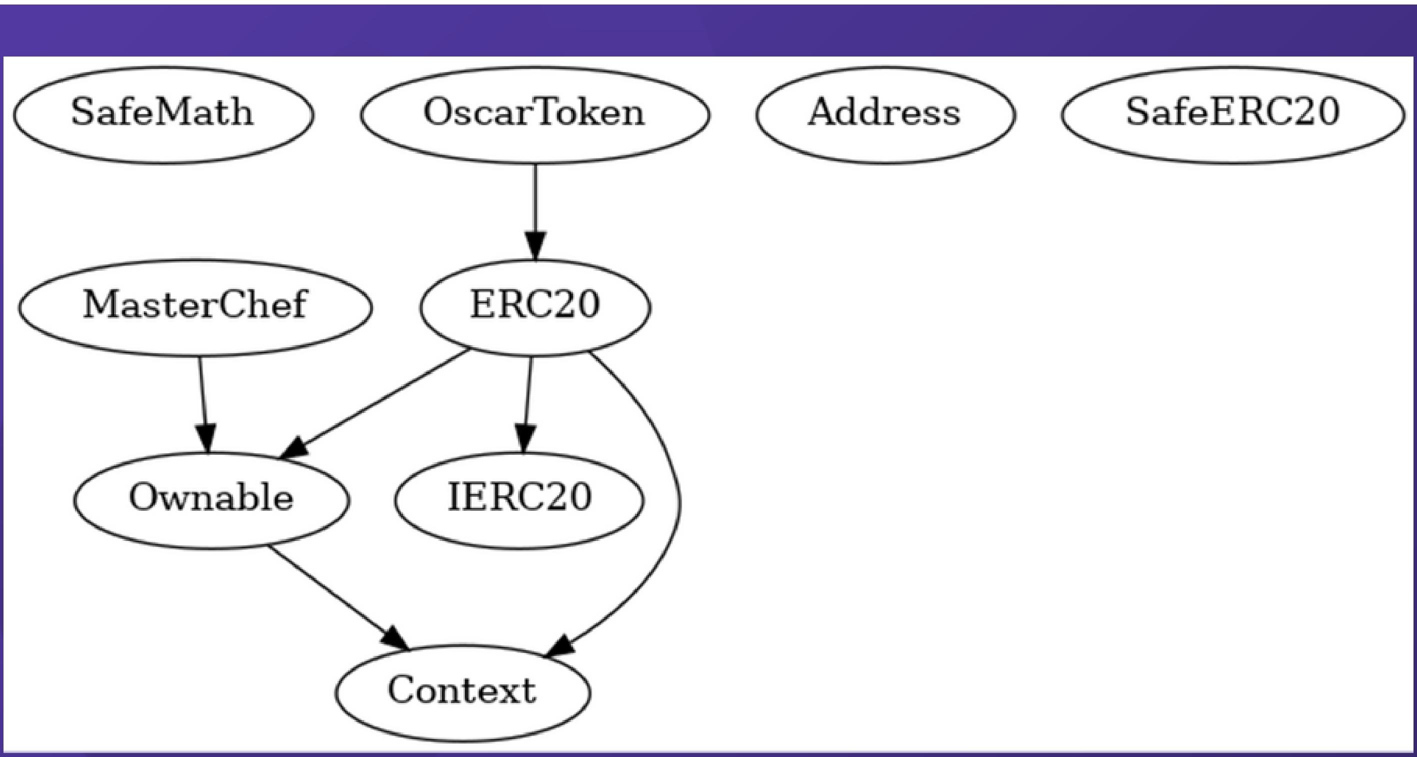
Low Risk

Issues on this level are minor details and warning that can remain unfixed.

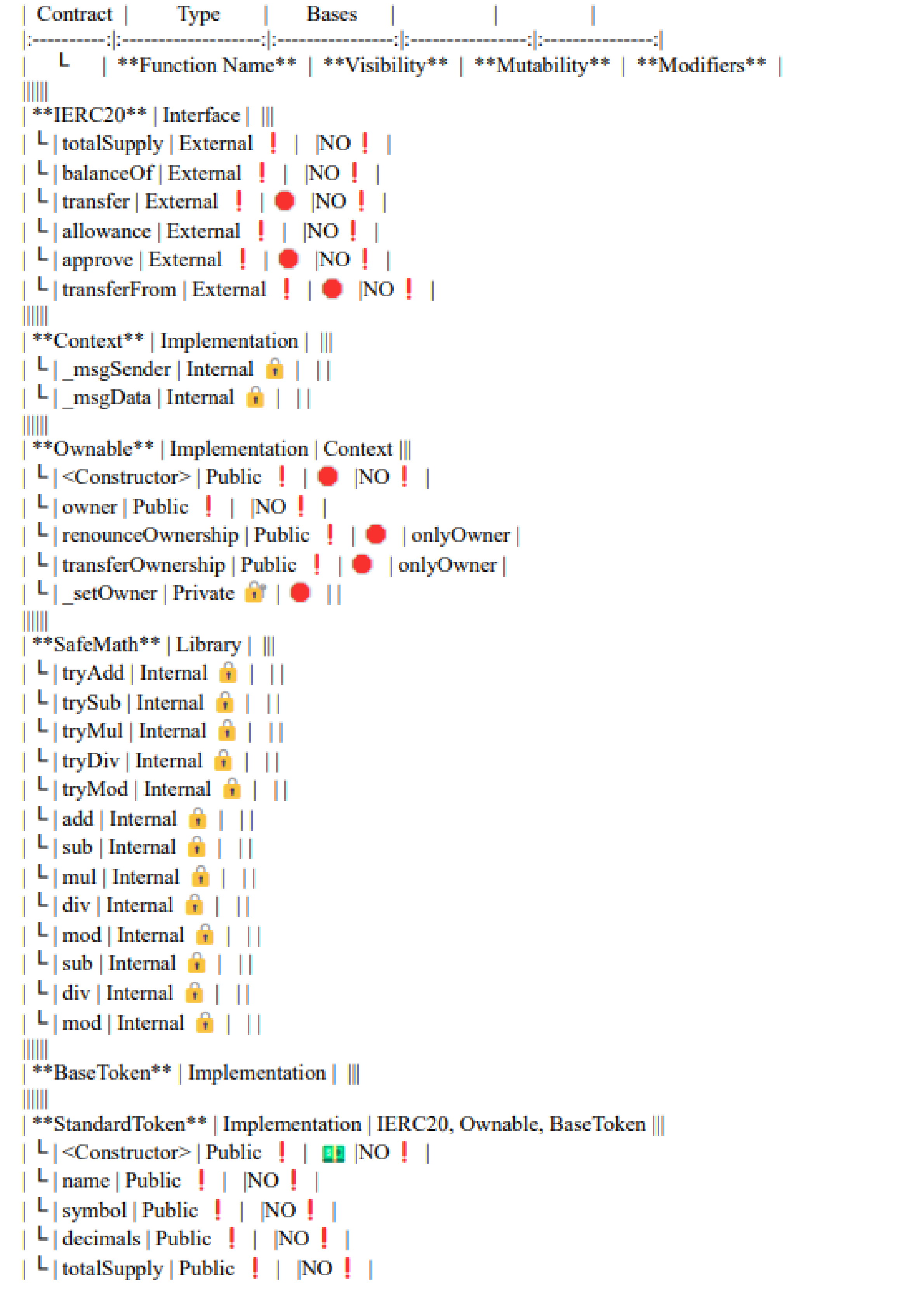
Informational

Issues on this level are minor details and warning that can remain unfixed.

INHERITANCE TREES

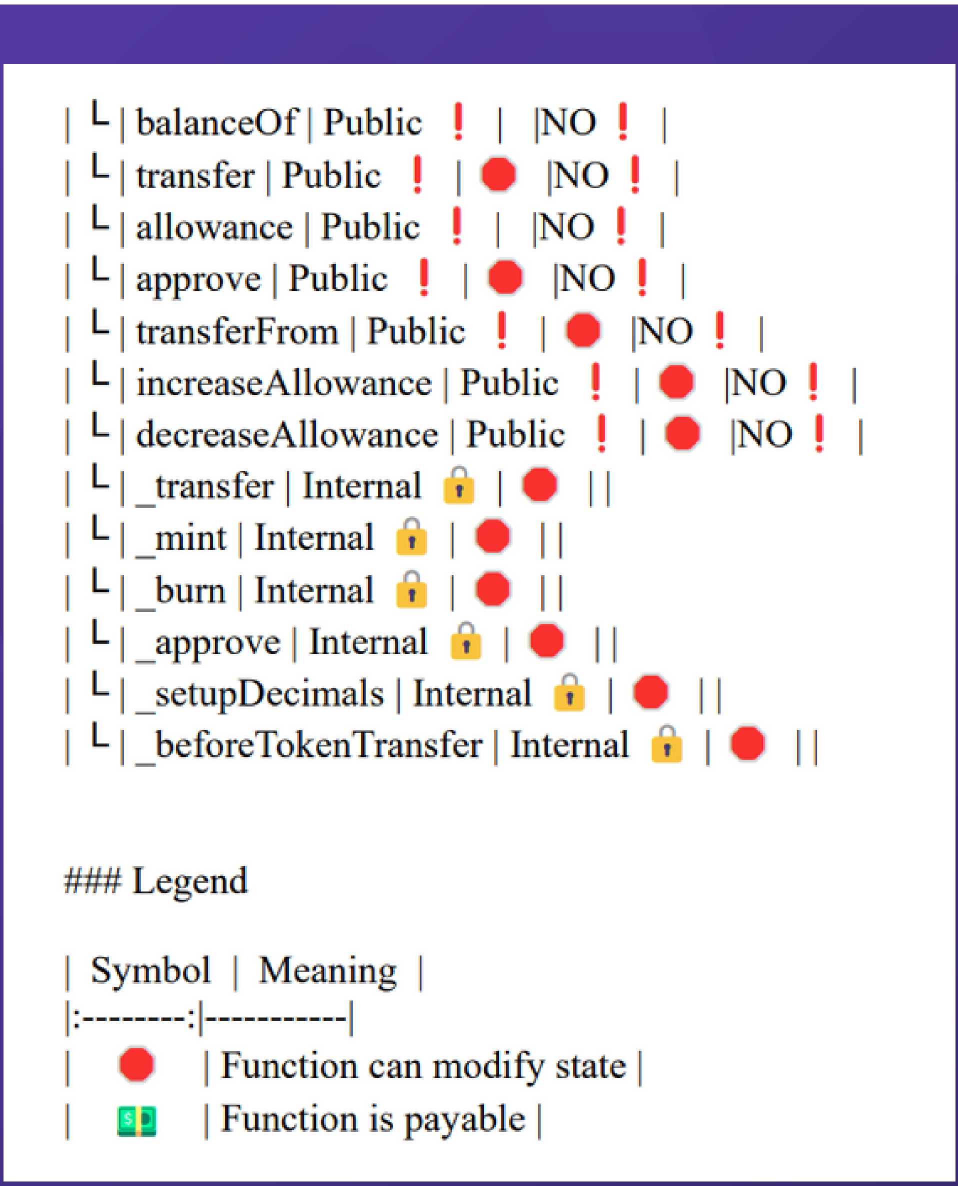


FUNCTION DETAILS



```
| Contract |        Type        |       Bases      |                  |                 |
|:----------:|:-------------------:|:----------------:|:----------------:|:---------------:|
|     └      | **Function Name** | **Visibility** | **Mutability** | **Modifiers** |
||||||
| **IERC20** | Interface |  |||
| └ | totalSupply | External ❗ |   |NO ❗ |
| └ | balanceOf | External ❗ |   |NO ❗ |
| └ | transfer | External ❗ | 🛑  |NO ❗ |
| └ | allowance | External ❗ |   |NO ❗ |
| └ | approve | External ❗ | 🛑  |NO ❗ |
| └ | transferFrom | External ❗ | 🛑  |NO ❗ |
||||||
| **Context** | Implementation |  |||
| └ | _msgSender | Internal 🔒 |   | |
| └ | _msgData | Internal 🔒 |   | |
||||||
| **Ownable** | Implementation | Context |||
| └ | <Constructor> | Public ❗ | 🛑  |NO ❗ |
| └ | owner | Public ❗ |   |NO ❗ |
| └ | renounceOwnership | Public ❗ | 🛑  | onlyOwner |
| └ | transferOwnership | Public ❗ | 🛑  | onlyOwner |
| └ | _setOwner | Private 🔐 | 🛑  | |
||||||
| **SafeMath** | Library |  |||
| └ | tryAdd | Internal 🔒 |   | |
| └ | trySub | Internal 🔒 |   | |
| └ | tryMul | Internal 🔒 |   | |
| └ | tryDiv | Internal 🔒 |   | |
| └ | tryMod | Internal 🔒 |   | |
| └ | add | Internal 🔒 |   | |
| └ | sub | Internal 🔒 |   | |
| └ | mul | Internal 🔒 |   | |
| └ | div | Internal 🔒 |   | |
| └ | mod | Internal 🔒 |   | |
| └ | sub | Internal 🔒 |   | |
| └ | div | Internal 🔒 |   | |
| └ | mod | Internal 🔒 |   | |
||||||
| **BaseToken** | Implementation |  |||
||||||
| **StandardToken** | Implementation | IERC20, Ownable, BaseToken |||
| └ | <Constructor> | Public ❗ | 💵 |NO ❗ |
| └ | name | Public ❗ |   |NO ❗ |
| └ | symbol | Public ❗ |   |NO ❗ |
| └ | decimals | Public ❗ |   |NO ❗ |
| └ | totalSupply | Public ❗ |   |NO ❗ |
```

FUNCTION DETAILS

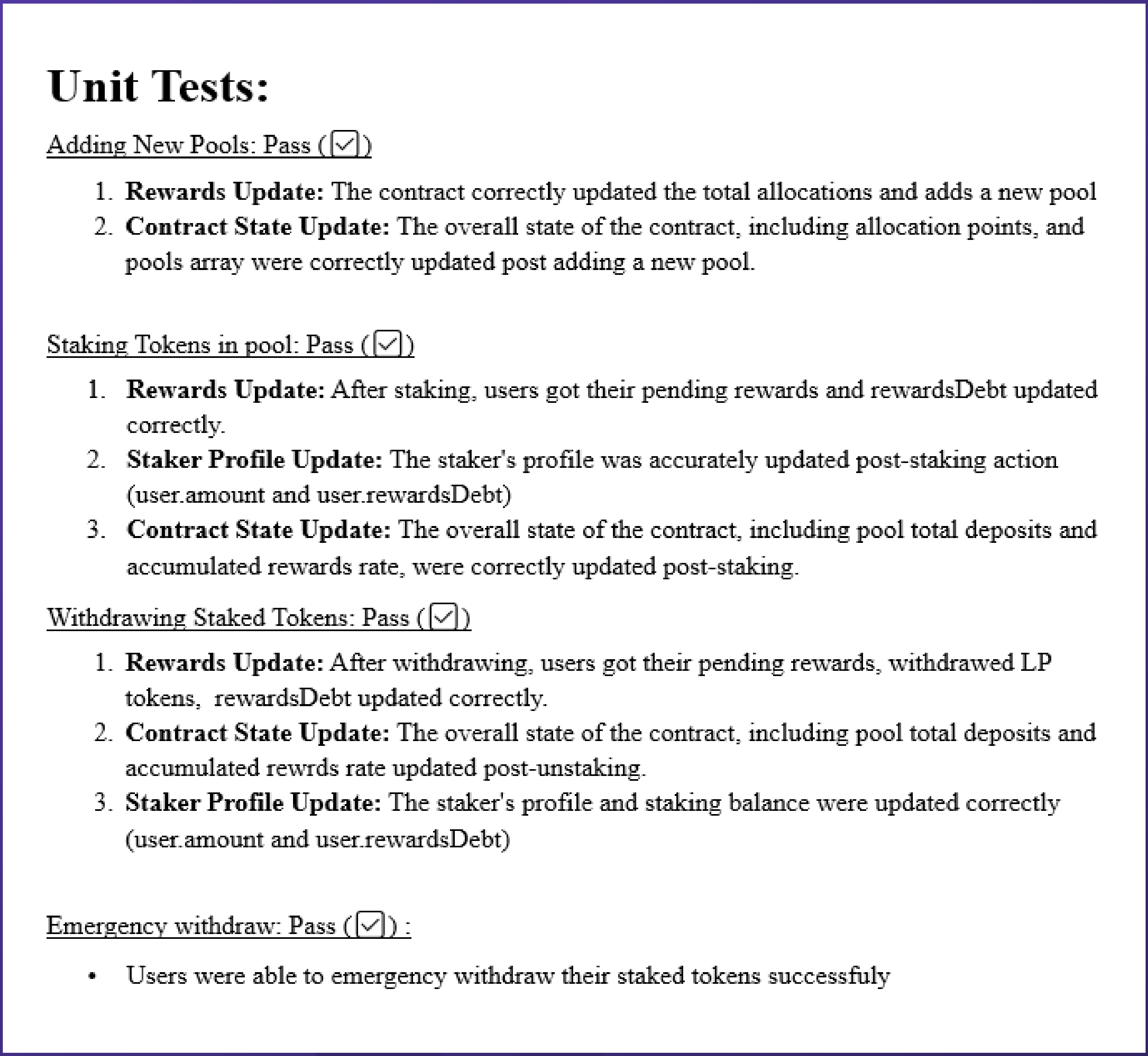


```
| └ | balanceOf | Public ❗ |   |NO ❗ |
| └ | transfer | Public ❗ | 🛑  |NO ❗ |
| └ | allowance | Public ❗ |   |NO ❗ |
| └ | approve | Public ❗ | 🛑  |NO ❗ |
| └ | transferFrom | Public ❗ | 🛑  |NO ❗ |
| └ | increaseAllowance | Public ❗ | 🛑  |NO ❗ |
| └ | decreaseAllowance | Public ❗ | 🛑  |NO ❗ |
| └ | _transfer | Internal 🔒 | 🛑  | |
| └ | _mint | Internal 🔒 | 🛑  | |
| └ | _burn | Internal 🔒 | 🛑  | |
| └ | _approve | Internal 🔒 | 🛑  | |
| └ | _setupDecimals | Internal 🔒 | 🛑  | |
| └ | _beforeTokenTransfer | Internal 🔒 | 🛑  | |


### Legend

|  Symbol  |  Meaning  |
|:--------:|-----------|
|    🛑    | Function can modify state |
|    💵    | Function is payable |
```

UNIT TESTS



Unit Tests:

Adding New Pools: Pass (☑)

1. **Rewards Update:** The contract correctly updated the total allocations and adds a new pool
2. **Contract State Update:** The overall state of the contract, including allocation points, and pools array were correctly updated post adding a new pool.

Staking Tokens in pool: Pass (☑)

1. **Rewards Update:** After staking, users got their pending rewards and rewardsDebt updated correctly.
2. **Staker Profile Update:** The staker's profile was accurately updated post-staking action (user.amount and user.rewardsDebt)
3. **Contract State Update:** The overall state of the contract, including pool total deposits and accumulated rewards rate, were correctly updated post-staking.

Withdrawing Staked Tokens: Pass (☑)

1. **Rewards Update:** After withdrawing, users got their pending rewards, withdrawed LP tokens, rewardsDebt updated correctly.
2. **Contract State Update:** The overall state of the contract, including pool total deposits and accumulated rewrds rate updated post-unstaking.
3. **Staker Profile Update:** The staker's profile and staking balance were updated correctly (user.amount and user.rewardsDebt)

Emergency withdraw: Pass (☑) :

- Users were able to emergency withdraw their staked tokens successfuly

MANUAL REVIEW

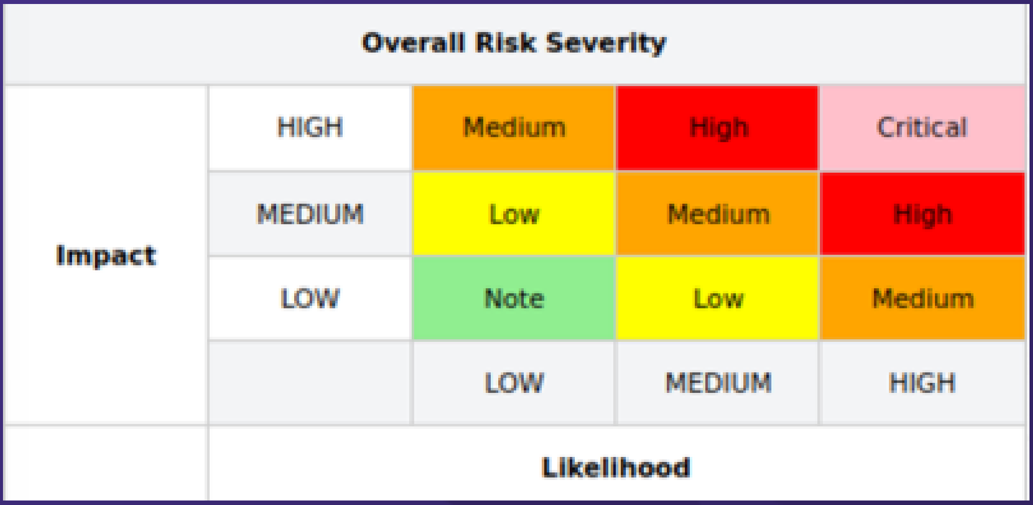
Severity Criteria

Expelee assesses the severity of disclosed vulnerabilities according to methodology based on OWASP standarts.

Vulnerabilities are dividend into three primary risk categroies:
High
Medium
Low

High-level considerations for vulnerabilities span the following key areas when conducting assessments:

- Malicious input handling
- Escalation of privileges
- Arithmetic
- Gas use



Overall Risk Severity				
Impact	HIGH	Medium	High	Critical
	MEDIUM	Low	Medium	High
	LOW	Note	Low	Medium
		LOW	MEDIUM	HIGH
	Likelihood			

HIGH RISK FINDING

Configuration / DOS / Data validation – Ability to arbitrary set reward per second settings

Severity : High

Status: Resolved (Contract is owned by safu developer)

Overview

Owner is able to set an arbitrary value as reward per second and also BONUS_MULTIPLIER, if this reward rate or BONUS_MULTIPLIER is set to max uint256 by a malicious actor, all functions of the contract (except emergency withdraw) would be disabled.

Code:

```
  function updateOscarPerSec(uint256 _oscarPerSec) public
onlyOwner {
    oscarPerSec = _oscarPerSec;
  }

  function updateMultiplier(uint256 multiplierNumber) public
onlyOwner {
    BONUS_MULTIPLIER = multiplierNumber;
  }
```

Suggestion:

Implement a limitation for max amount of oscarPerSec and BONUS_MULTIPLIER or create a governance model to only update this values based on community votes.

HIGH RISK FINDING

Centralization -Ability to add pool for any arbitrary token

Severity : High

Status: Resolved (Contract is owned by safu developer)

Overview

Owner is able to add any pool to the contract, with an arbitrary amount of allocation point and an arbitrary ERC20 token. A malicious actor can add a new pool with a very large number of allocation points and receive majority of the rewards per second

Code:

```
  function add(uint256 _oscarAllocPoint, IERC20 _lpToken, bool
_withUpdate) public onlyOwner {
     if (_withUpdate) {
        massUpdatePools();
     }
     uint256 lastRewardTime = block.timestamp > startTime ?
block.timestamp : startTime;
     oscarTotalAllocPoint =
oscarTotalAllocPoint.add(_oscarAllocPoint);

 poolInfo.push(
        PoolInfo({
           lpToken: _lpToken,
           oscarAllocPoint: _oscarAllocPoint,
           lastRewardTime: lastRewardTime,
           accOscarPerShare: 0,
           totalDeposit: 0
        })
     );
  }
```

HIGH RISK FINDING

Suggestion:

Implement a more decentralized method for adding new pools or changing states of an existing pool

MEDIUM RISK FINDING

Missing logic – Pool states are not updated correctly

Severity : Medium

Status: acknowledged (team decided to leave the codebase unchanged)

Overview
at emergencyWithdraw function, total deposit of the pool is not updated correctly, exiting the contract throught this function can result in unexpected behaviour

Code:

```
  function emergencyWithdraw(uint256 _pid) public {
    PoolInfo storage pool = poolInfo[_pid];
    UserInfo storage user = userInfo[_pid][msg.sender];
pool.lpToken.safeTransfer(address(msg.sender), user.amount);
    emit EmergencyWithdraw(msg.sender, _pid, user.amount);
    user.amount = 0;
    user.oscarRewardDebt = 0;
  }
```

Suggestion:
 update pool.totalDeposit:

```
  function emergencyWithdraw(uint256 _pid) public {
    PoolInfo storage pool = poolInfo[_pid];
    UserInfo storage user = userInfo[_pid][msg.sender];
pool.lpToken.safeTransfer(address(msg.sender), user.amount);
    pool.totalDeposit -= user.amount;
    emit EmergencyWithdraw(msg.sender, _pid, user.amount);
    user.amount = 0;
    user.oscarRewardDebt = 0;
  }
```

MEDIUM RISK FINDING

Configuration / DOS / Data validation – Setting treasury wallet to any arbitrary address

Severity : Medium

Status: Resolved (Contract is owned by safu developer)

Overview

treasury address can be set to any arbitrary address. If treasury address is set to address(0), depending on impelementation of the reward token claiming rewards could be disabled.
This is because in majority of ERC20 tokens, transferring to this address is forbidden

Code:

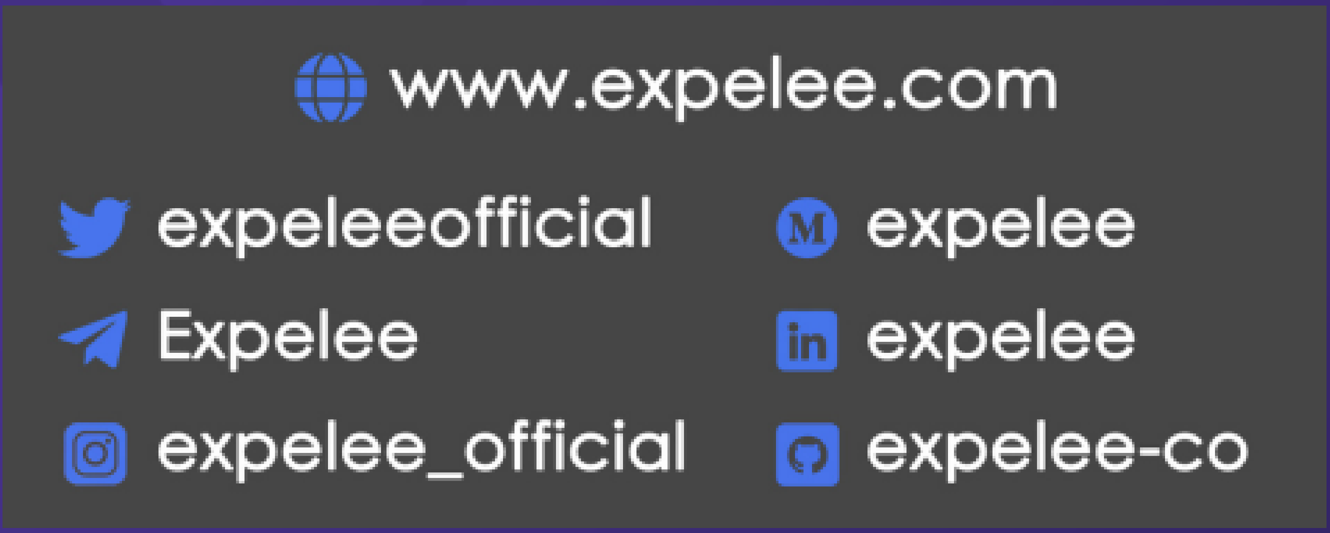
```
function setTreasury(address _treasury) public onlyOwner {
   treasury = _treasury;
}
```

Suggestion:

Ensure that new treasury wallet is not address(0).

ABOUT EXPELEE

Expelee is a product-based aspirational Web3 start-up. Coping up with numerous solutions for blockchain security and constructing a Web3 ecosystem from deal making platform to developer hosting open platform, while also developing our own commercial and sustainable blockchain.



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