InterFi NETWORK

SMART CONTRACT AUDIT

interfinetwork

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PREPARED FOR

ULALO

INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	Ulalo
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Contract	0x464361e01D7C633A9C37e85aab51833259E51f5E
Blockchain	Ethereum Chain
Centralization	Active Ownership
Commit	578b7b2a8a6c762d3d16079854b139830c1d68e4
Website	https://ulalo.xyz/
Telegram	https://t.me/+Zeg3Q8tRseEzM2U8/
X (Twitter)	https://x.com/ulalo_io/
Report Date	June 27, 2024

Verify the authenticity of this report on our website: https://www.github.com/interfinetwork

EXECUTIVE SUMMARY

InterFi has performed the automated and manual analysis of solidity codes. Solidity codes were reviewed for common contract vulnerabilities and centralized exploits. Here's a quick audit summary:

Status	Critical 🔴	Major 🟠	Medium 🟡	Minor 🟢	Unknown 🟤
Open	0	1	0	3	0
Acknowledged	1	0	0	2	0
Resolved	0	0	0	1	0
Critical 🔴 Privileges	Mint, Destroy from Account, Add Blacklist, Destroy Black Funds, Set Transfer Delay, Set Max Transaction Percent				

ℹ️ Please note that smart contracts deployed on blockchains aren't resistant to exploits, vulnerabilities and/or hacks. Blockchain and cryptography assets utilize new and emerging technologies. These technologies present a high level of ongoing risks. For a detailed understanding of risk severity, source code vulnerability, and audit limitations, kindly review the audit report thoroughly.

ℹ️ Please note that centralization privileges regardless of their inherited risk status - constitute an elevated impact on smart contract safety and security.

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SCOPE OF WORK

InterFi was consulted by Ulalo to conduct the smart contract audit of their solidity source codes. The audit scope of work is strictly limited to mentioned solidity file(s) only:

- UlaloToken.sol

If source codes are not deployed on the main net, they can be modified or altered before main-net deployment. Verify the contract's deployment status below:

Public Contract Link	
https://etherscan.io/address/0x464361e01D7C633A9C37e85aab51833259E51f5E#code	
Contract Name	UlaloToken
Compiler Version	0.8.0
License	MIT

AUDIT METHODOLOGY

Smart contract audits are conducted using a set of standards and procedures. Mutual collaboration is essential to performing an effective smart contract audit. Here's a brief overview of InterFi's auditing process and methodology:

CONNECT

- The onboarding team gathers source codes, and specifications to make sure we understand the size, and scope of the smart contract audit.

AUDIT

- Automated analysis is performed to identify common contract vulnerabilities. We may use the following third-party frameworks and dependencies to perform the automated analysis:
  - Remix IDE Developer Tool
  - Open Zeppelin Code Analyzer
  - SWC Vulnerabilities Registry
  - DEX Dependencies, e.g., Pancakeswap, Uniswap
- Simulations are performed to identify centralized exploits causing contract and/or trade locks.
- A manual line-by-line analysis is performed to identify contract issues and centralized privileges. We may inspect below mentioned common contract vulnerabilities, and centralized exploits:

Centralized Exploits	○ Token Supply Manipulation ○ Access Control and Authorization ○ Assets Manipulation ○ Ownership Control ○ Liquidity Access ○ Stop and Pause Trading ○ Ownable Library Verification

Common Contract Vulnerabilities	○ Integer Overflow ○ Lack of Arbitrary limits ○ Incorrect Inheritance Order ○ Typographical Errors ○ Requirement Violation ○ Gas Optimization ○ Coding Style Violations ○ Re-entrancy ○ Third-Party Dependencies ○ Potential Sandwich Attacks ○ Irrelevant Codes ○ Divide before multiply ○ Conformance to Solidity Naming Guides ○ Compiler Specific Warnings ○ Language Specific Warnings

REPORT

- The auditing team provides a preliminary report specifying all the checks which have been performed and the findings thereof.
- The client's development team reviews the report and makes amendments to solidity codes.
- The auditing team provides the final comprehensive report with open and unresolved issues.

PUBLISH

- The client may use the audit report internally or disclose it publicly.

It is important to note that there is no pass or fail in the audit, it is recommended to view the audit as an unbiased assessment of the safety of solidity codes.

RISK CATEGORIES

A successful external attack may allow the external attacker to directly exploit. A successful centralization-related exploit may allow the privileged role to directly exploit. All risks which are identified in the audit report are categorized:

Risk Type	Definition
Critical 🔴	These risks pose immediate and severe threats, such as asset theft, data manipulation, or complete loss of contract functionality. They are often easy to exploit and can lead to significant, irreparable damage. Immediate fix is required.
Major 🟠	These risks can significantly impact code performance and security, and they may indirectly lead to asset theft and data loss. They can allow unauthorized access or manipulation of sensitive functions if exploited. Fixing these risks are important.
Medium 🟡	These risks may create attack vectors under certain conditions. They may enable minor unauthorized actions or lead to inefficiencies that can be exploited indirectly to escalate privileges or impact functionality over time.
Minor 🟢	These risks may include inefficiencies, lack of optimizations, code-style violations. These should be addressed to enhance overall code quality and maintainability.
Unknown 🟤	These risks pose uncertain severity to the contract or those who interact with it. Immediate fix is required to mitigate risk uncertainty.

All statuses which are identified in the audit report are categorized here:

Status Type	Definition
Open	Risks are open.
Acknowledged	Risks are acknowledged, but not fixed.
Resolved	Risks are acknowledged and fixed.

CENTRALIZED PRIVILEGES

Centralization risk is the most common cause of cryptography asset loss. When a smart contract has a privileged role, the risk related to centralization is elevated.

There are some well-intended reasons have privileged roles, such as:

- Privileged roles can be granted the power to `pause()` the contract in case of an external attack.
- Privileged roles can use functions like, `include()`, and `exclude()` to add or remove wallets from fees, swap checks, and transaction limits. This is useful to run a presale and to list on an exchange.

Authorizing privileged roles to externally-owned-account (EOA) is dangerous. Lately, centralization-related losses are increasing in frequency and magnitude.

- The client can lower centralization-related risks by implementing below mentioned practices:
- Privileged role's private key must be carefully secured to avoid any potential hack.
- Privileged role should be shared by multi-signature (multi-sig) wallets.
- Authorized privilege can be locked in a contract, user voting, or community DAO can be introduced to unlock the privilege.
- Renouncing the contract ownership, and privileged roles.
- Remove functions with elevated centralization risk.

Understand the project's initial asset distribution. Assets in the liquidity pair should be locked. Assets outside the liquidity pair should be locked with a release schedule.

AUTOMATED ANALYSIS

Symbol	Definition
🛑	Function modifies state
💵	Function is payable
🔒	Function is internal
🔐	Function is private
❗	Function is important

```
| **IERC20** | Interface |  |||
| └ | totalSupply | External ❗ |   |NO❗ |
| └ | balanceOf | External ❗ |   |NO❗ |
| └ | transfer | External ❗ | 🛑  |NO❗ |
| └ | allowance | External ❗ |   |NO❗ |
| └ | approve | External ❗ | 🛑  |NO❗ |
| └ | transferFrom | External ❗ | 🛑  |NO❗ |
||||||
| **IERC20Metadata** | Interface | IERC20 |||
| └ | name | External ❗ |   |NO❗ |
| └ | symbol | External ❗ |   |NO❗ |
| └ | decimals | External ❗ |   |NO❗ |
||||||
| **Context** | Implementation |  |||
| └ | _msgSender | Internal 🔒 |   | |
| └ | _msgData | Internal 🔒 |   | |
||||||
| **Ownable** | Implementation |  |||
```

| └ | <Constructor> | Public ❗ | 🛑 |NO❗ |

| └ | owner | Public ❗ | |NO❗ |

| └ | renounceOwnership | Public ❗ | 🛑 | onlyOwner |

| └ | transferOwnership | Public ❗ | 🛑 | onlyOwner |

||||||

| **UlaloToken** | Implementation | Context, IERC20, IERC20Metadata, Ownable |||

| └ | <Constructor> | Public ❗ | 🛑 |NO❗ |

| └ | name | Public ❗ | |NO❗ |

| └ | symbol | Public ❗ | |NO❗ |

| └ | decimals | Public ❗ | |NO❗ |

| └ | totalSupply | Public ❗ | |NO❗ |

| └ | balanceOf | Public ❗ | |NO❗ |

| └ | transfer | Public ❗ | 🛑 |NO❗ |

| └ | allowance | Public ❗ | |NO❗ |

| └ | approve | Public ❗ | 🛑 |NO❗ |

| └ | transferFrom | Public ❗ | 🛑 |NO❗ |

| └ | increaseAllowance | Public ❗ | 🛑 |NO❗ |

| └ | decreaseAllowance | Public ❗ | 🛑 |NO❗ |

| └ | mint | Public ❗ | 🛑 | onlyOwner |

| └ | destroy | Public ❗ | 🛑 | onlyOwner |

| └ | _transfer | Internal 🔒 | 🛑 | |

| └ | _mint | Internal 🔒 | 🛑 | |

| └ | _burn | Internal 🔒 | 🛑 | |

| └ | _approve | Internal 🔒 | 🛑 | |

| └ | addBlackList | External ❗ | 🛑 | onlyOwner |

| └ | removeBlackList | External ❗ | 🛑 | onlyOwner |

| └ | destroyBlackFunds | External ❗ | 🛑 | onlyOwner |

| └ | createTGEWhitelist | External ❗ | 🛑 | onlyOwner |

| └ | modifyTGEWhitelist | External ❗ | 🛑 | onlyOwner |

| └ | getTGEWhitelistRound | Public ❗ | |NO❗ |

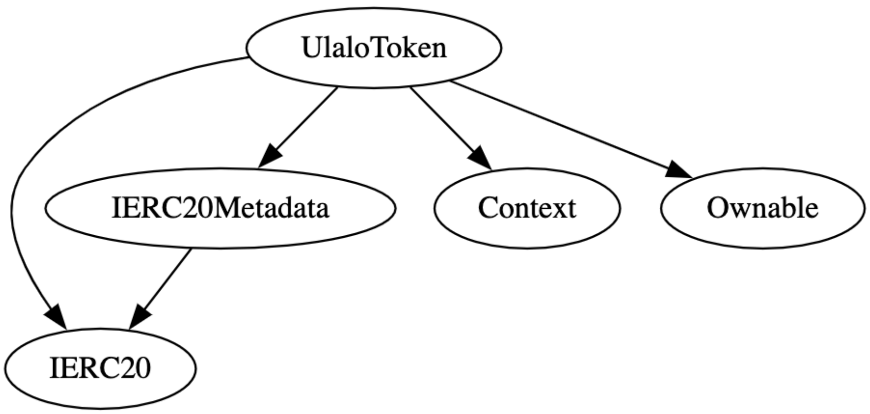
| └ | _applyTGEWhitelist | Internal 🔒 | 🛑 | |

| └ | setMaxTxPercent | External ❗ | 🛑 | onlyOwner |

| └ | setTransferDelay | External ❗ | 🛑 | onlyOwner |

| └ | setAntibotPaused | External ❗ | 🛑 | onlyOwner |

INHERITANCE GRAPH



MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralized privileges	Critical 🔴
CEN-01-01	Privileged role has authority to blacklist accounts	
CEN-01-02	Privileged role can destroy tokens from blacklisted accounts	
CEN-01-03	Privileged role can destroy tokens from user accounts	
CEN-01-04	Privileged role can set transfer delay, and max transaction amount	
CEN-01-05	Privileged role has authority to mint tokens after deployment	

Important `onlyOwner` centralized privileges are listed below:


```
renounceOwnership()
transferOwnership()
mint()
destroy()
addBlackList()
removeBlackList()
destroyBlackFunds()
createTGEWhitelist()
modifyTGEWhitelist()
setMaxTxPercent()
setTransferDelay()
setAntibotPaused()
```

RECOMMENDATION

Securing private keys or access credentials of deployers, contract owners, operators, and other roles with privileged access is crucial to prevent single points of failure that can compromise contract security.

Use of multi-signature wallets is recommended – These wallets require multiple authorizations to execute sensitive contract functions, reducing the risk associated with single-party control.

Use of decentralized governance model is recommended – This model allows token holders and stakeholders to actively participate in decision-making, such as contract upgrades and parameter adjustments, enhancing overall security and resilience.

ACKNOWLEDGEMENT

Ulalo team has argued that privileged roles are used as required.

Identifier	Definition	Severity
CEN-02	Initial token allocation	Minor

Upon deployment, all initially minted tokens are transferred to the contract deployer. It could be an issue as the deployer can distribute tokens without consulting the community.

```
_mint(msg.sender, 1000000000 * (10**uint256(decimals())));
```


RECOMMENDATION

Establish transparent tokenomics model that involves community input in the decision-making process regarding token allocation.

ACKNOWLEDGEMENT

Ulalo team has clarified that initial token allocation will adhere strictly to pre-determined tokenomics outlined in project documentation.

Identifier	Definition	Severity
LOG-01	Insufficient input boundaries	Major

Below mentioned functions are set without sufficient input boundaries:

```
mint()
destroy()
setMaxTxPercent()
setTransferDelay()
```


RECOMMENDATION

Establish clear upper or lower boundaries. All operational parameters remain within safe and rational ranges.

Identifier	Definition	Severity
LOG-02	Potential front-running	Minor

Potential front-running happens when an attacker observes a transaction swapping tokens or adding liquidity without setting restrictions on slippage or minimum output amount. The attacker can manipulate the exchange rate by front-running a transaction to purchase assets and make profits by back-running a transaction to sell assets.

RECOMMENDATION

Functions that execute critical state changes should enforce minimum output thresholds. Setting these minimums above zero can deter malicious actors by reducing the predictability and profitability of front-running strategies.

Implement commit-reveal schemes or transaction ordering to protect against front-running.

ACKNOWLEDGEMENT

Front-running is not avoidable on public blockchains. Ulalo team commented that, most EVM chains are prone to some sort of front-running and external manipulation.

Identifier	Definition	Severity
COD-02	Timestamp dependence	Minor

Be aware that the timestamp of the block can be manipulated by miners. Since miners can slightly adjust the timestamp, they may influence contract outcomes to their advantage.

RECOMMENDATION

Avoid relying solely on timestamp of the block for critical contract functions. Follow 15 seconds rule, and scale time dependent events accordingly.

Identifier	Definition
COD-09	Lack of contract balance withdraw

Smart contract may collect tokens, and ethers from external addresses. Some swap, and liquidity-add events may accumulate residual ethers, and tokens. Add `withdraw()` function to take out tokens and ethers from the contract.

Identifier	Definition	Severity
COD-10	Direct and indirect dependencies	Unknown

Smart contract is interacting with third party protocols e.g., DEX routers, external contracts, web3 applications, *OpenZeppelin* ERC20 libraries. The scope of the audit treats these entities as black boxes and assumes their functional correctness. However, in the real world, all of them can be compromised, and exploited. Moreover, upgrades in these entities can create severe impacts, e.g., increased transactional fees, deprecation of previous routers, etc.

RECOMMENDATION

Inspect third party dependencies regularly, and mitigate severe impacts whenever necessary.

ACKNOWLEDGEMENT

Ulalo team will inspect third party dependencies regularly, and push upgrades whenever required.

Identifier	Definition	Severity
COD-12	Lack of event-driven architecture	Minor

Smart contract uses function calls to update state, which can make it difficult to track and analyze changes to the contract over time.

RECOMMENDATION

Use events to track state changes. Events improve transparency and provide a more granular view of contract activity.

Identifier	Definition	Severity
COM-01	Floating pragma	Minor

Compiler is set to `^0.8.0`

RECOMMENDATION

Pragma should be fixed to stable compiler version. Fixing pragma ensures compatibility and prevents the contract from being compiled with incompatible compiler versions.

RESOLUTION

Smart contract is deployed with stable compiler.

Identifier	Definition	Severity
COM-04	Gas optimization	Minor

Below mentioned functions, arrays, or loops may consume more gas than usual:

```
createTGEWhitelist()
modifyTGEWhitelist()
```


RECOMMENDATION

Optimize functions, arrays, and loops identified as high gas consumers by simplifying logic, minimizing state changes, and limiting loop iterations where possible.

DISCLAIMERS

InterFi Network provides the easy-to-understand audit of solidity source codes (commonly known as smart contracts).

The smart contract for this particular audit was analyzed for common contract vulnerabilities, and centralization exploits. This audit report makes no statements or warranties on the security of the code. This audit report does not provide any warranty or guarantee regarding the absolute bug-free nature of the smart contract analyzed, nor do they provide any indication of the client's business, business model or legal compliance. This audit report does not extend to the compiler layer, any other areas beyond the programming language, or other programming aspects that could present security risks. Cryptographic tokens are emergent technologies, they carry high levels of technical risks and uncertainty. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. This audit report could include false positives, false negatives, and other unpredictable results.

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InterFi Network provides intelligent blockchain solutions. We provide solidity development, testing, and auditing services. We have developed 150+ solidity codes, audited 1000+ smart contracts, and analyzed 500,000+ code lines. We have worked on major public blockchains e.g., Ethereum, Binance, Cronos, Doge, Polygon, Avalanche, Metis, Fantom, Bitcoin Cash, Velas, Oasis, etc.

InterFi Network is built by engineers, developers, UI experts, and blockchain enthusiasts. Our team currently consists of 4 core members, and 6+ casual contributors.

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SMART CONTRACT AUDITS | SOLIDITY DEVELOPMENT AND TESTING

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