Cyberscope

Audit Report

Lightchain AI

December 2024

Network	ETH
Address	0x9cA8530CA349c966Fe9ef903Df17a75B8A778927
Audited by	© cyberscope

Analysis

Critical Medium Minor / Informative Pass

Severity	Code	Description	Status
●	ST	Stops Transactions	Unresolved
●	OTUT	Transfers User's Tokens	Passed
●	ELFM	Exceeds Fees Limit	Passed
●	MT	Mints Tokens	Passed
●	BT	Burns Tokens	Passed
●	BC	Blacklists Addresses	Passed

Diagnostics

Critical Medium Minor / Informative

Severity	Code	Description	Status
	FDU	Fixed Decimal Usage	Unresolved
	NWES	Nonconformity with ERC-20 Standard	Unresolved
	L02	State Variables could be Declared Constant	Unresolved
	L04	Conformance to Solidity Naming Conventions	Unresolved
	L19	Stable Compiler Version	Unresolved

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Risk Classification

The criticality of findings in Cyberscope's smart contract audits is determined by evaluating multiple variables. The two primary variables are:

1. **Likelihood of Exploitation**: This considers how easily an attack can be executed, including the economic feasibility for an attacker.
2. **Impact of Exploitation**: This assesses the potential consequences of an attack, particularly in terms of the loss of funds or disruption to the contract's functionality.

Based on these variables, findings are categorized into the following severity levels:

1. **Critical**: Indicates a vulnerability that is both highly likely to be exploited and can result in significant fund loss or severe disruption. Immediate action is required to address these issues.
2. **Medium**: Refers to vulnerabilities that are either less likely to be exploited or would have a moderate impact if exploited. These issues should be addressed in due course to ensure overall contract security.
3. **Minor**: Involves vulnerabilities that are unlikely to be exploited and would have a minor impact. These findings should still be considered for resolution to maintain best practices in security.
4. **Informative**: Points out potential improvements or informational notes that do not pose an immediate risk. Addressing these can enhance the overall quality and robustness of the contract.

Severity	Likelihood / Impact of Exploitation
Critical	Highly Likely / High Impact
Medium	Less Likely / High Impact or Highly Likely/ Lower Impact
Minor / Informative	Unlikely / Low to no Impact

Review

Contract Name	LightchainAI
Compiler Version	v0.8.20+commit.a1b79de6
Optimization	200 runs
Explorer	https://etherscan.io/address/0x9ca8530ca349c966fe9ef903df17a75b8a778927
Address	0x9ca8530ca349c966fe9ef903df17a75b8a778927
Network	ETH
Symbol	LCAI
Decimals	18
Total Supply	10,000,000,000
Badge Eligibility	Yes

Audit Updates

Initial Audit	06 Dec 2024

Source Files

Filename	SHA256
LightchainAI.sol	a0ac0739f6a8f0530426c854135366f1d9e8f8d77d6aa9417593324c97bd774e

Findings Breakdown

Critical	1
Medium	0
Minor / Informative	5

Severity	Unresolved	Acknowledged	Resolved	Other
Critical	1	0	0	0
Medium	0	0	0	0
Minor / Informative	5	0	0	0

ST - Stops Transactions

Criticality	Critical
Location	LightchainAI.sol#L306
Status	Unresolved

Description

The transactions are initially disabled for all users excluding the authorized addresses. The owner can enable the transactions for all users. Once the transactions are enable the owner will not be able to disable them again.

```
if (!whitelist[from] && !whitelist[to]) {
    require(trading, "LightchainAI: Trading is disabled");
}
```

Recommendation

The team should carefully manage the private keys of the owner's account. We strongly recommend a powerful security mechanism that will prevent a single user from accessing the contract admin functions. Some suggestions are:

- Introduce a multi-sign wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.

FDU - Fixed Decimal Usage

Criticality	Minor / Informative
Location	LightchainAI.sol#L163
Status	Unresolved

Description

The contract is using a hardcoded value of 18 for its token supply calculations, instead of utilizing the `decimals` variable. While this approach works as intended, it bypasses the built-in flexibility of using the `decimals` variable, which is specifically defined for such purposes. This could lead to reduced clarity and potential inconsistencies in the token logic.

```
uint8 private _decimals = 18;
uint256 private _totalSupply = 10_000_000_000 * 1e18;
```

Recommendation

It is recommended to use the `decimals` variable in the total supply calculation instead of directly hardcoding the value. This approach ensures that the token supply calculation aligns with the declared decimal precision, maintaining clarity and consistency within the contract logic.

NWES - Nonconformity with ERC-20 Standard

Criticality	Minor / Informative
Location	LightchainAI.sol#L304
Status	Unresolved

Description

The contract is not fully conforming to the ERC20 Standard. Specifically, according to the standard, transfers of 0 values must be treated as normal transfers and fire the Transfer event. However the contract implements, a conditional check that prohibits transfers of 0 values.

This discrepancy between the contract's implementation and the ERC20 standard may lead to inconsistencies and incompatibilities with other contracts.

```
function _transfer(address from,address to,int256 amount)
private {
...
require(amount > 0, "Transfer amount must be greater than
zero");
...
}
```

Recommendation

The incorrect implementation of the ERC20 standard could potentially lead to problems when interacting with the contract, as other contracts or applications that expect the ERC20 interface may not behave as expected. The team is advised to review and revise the implementation of the transfer mechanism to ensure full compliance with the ERC20 standard. https://eips.ethereum.org/EIPS/eip-20.

L02 - State Variables could be Declared Constant

Criticality	Minor / Informative
Location	LightchainAI.sol#L157,158,159,160
Status	Unresolved

Description

State variables can be declared as constant using the constant keyword. This means that the value of the state variable cannot be changed after it has been set. Additionally, the constant variables decrease gas consumption of the corresponding transaction.

```
string private _name = "LightchainAI"
string private _symbol = "LCAI"
uint8 private _decimals = 18
uint256 private _totalSupply = 10_000_000_000 * 1e18
```

Recommendation

Constant state variables can be useful when the contract wants to ensure that the value of a state variable cannot be changed by any function in the contract. This can be useful for storing values that are important to the contract's behavior, such as the contract's address or the maximum number of times a certain function can be called. The team is advised to add the constant keyword to state variables that never change.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	LightchainAI.sol#L274
Status	Unresolved

Description

The Solidity style guide is a set of guidelines for writing clean and consistent Solidity code. Adhering to a style guide can help improve the readability and maintainability of the Solidity code, making it easier for others to understand and work with.

The followings are a few key points from the Solidity style guide:

1. Use camelCase for function and variable names, with the first letter in lowercase (e.g., myVariable, updateCounter).
2. Use PascalCase for contract, struct, and enum names, with the first letter in uppercase (e.g., MyContract, UserStruct, ErrorEnum).
3. Use uppercase for constant variables and enums (e.g., MAX_VALUE, ERROR_CODE).
4. Use indentation to improve readability and structure.
5. Use spaces between operators and after commas.
6. Use comments to explain the purpose and behavior of the code.
7. Keep lines short (around 120 characters) to improve readability.

```
bool _status
address _user
```

Recommendation

By following the Solidity naming convention guidelines, the codebase increased the readability, maintainability, and makes it easier to work with.
Find more information on the Solidity documentation
https://docs.soliditylang.org/en/stable/style-guide.html#naming-conventions.

L19 - Stable Compiler Version

Criticality	Minor / Informative
Location	LightchainAI.sol#L11
Status	Unresolved

Description

The `^` symbol indicates that any version of Solidity that is compatible with the specified version (i.e., any version that is a higher minor or patch version) can be used to compile the contract. The version lock is a mechanism that allows the author to specify a minimum version of the Solidity compiler that must be used to compile the contract code. This is useful because it ensures that the contract will be compiled using a version of the compiler that is known to be compatible with the code.

```
pragma solidity ^0.8.20;
```

Recommendation

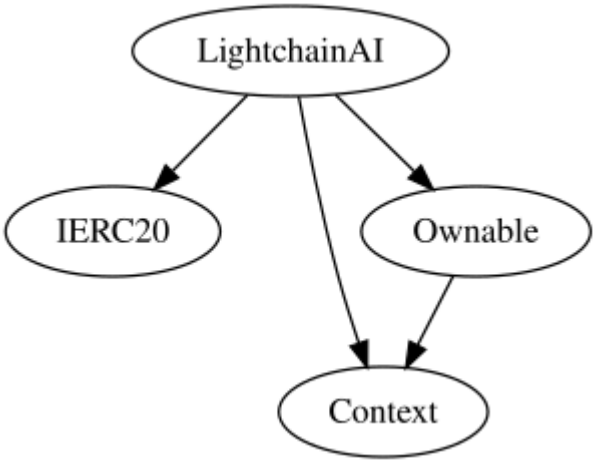
The team is advised to lock the pragma to ensure the stability of the codebase. The locked pragma version ensures that the contract will not be deployed with an unexpected version. An unexpected version may produce vulnerabilities and undiscovered bugs. The compiler should be configured to the lowest version that provides all the required functionality for the codebase. As a result, the project will be compiled in a well-tested LTS (Long Term Support) environment.

Functions Analysis

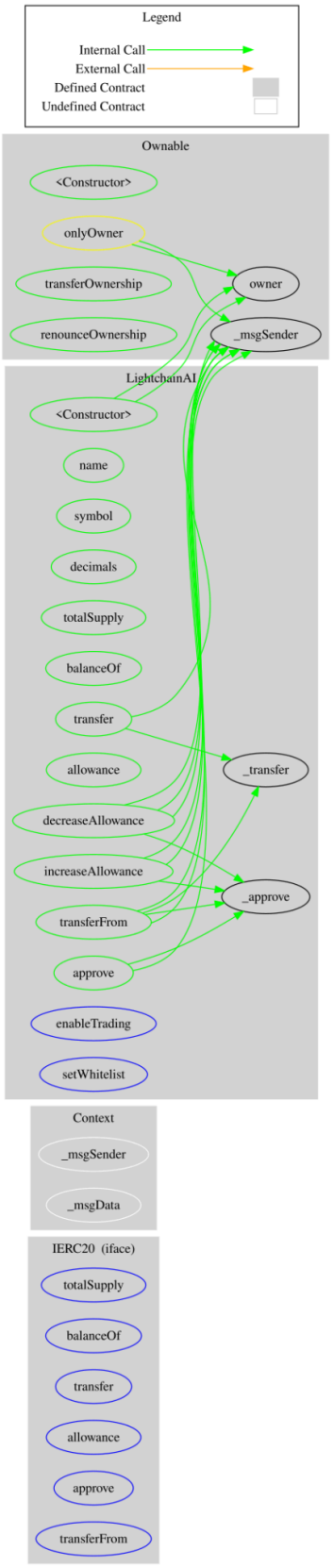
Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
LightchainAI	Implementation	Context, IERC20, Ownable		
		Public	✓	Ownable
	name	Public		-
	symbol	Public		-
	decimals	Public		-
	totalSupply	Public		-
	balanceOf	Public		-
	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	increaseAllowance	Public	✓	-
	decreaseAllowance	Public	✓	-
	enableTrading	External	✓	onlyOwner
	setWhitelist	External	✓	onlyOwner
	_approve	Private	✓	

	_transfer	Private	✓	

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
Ownable
<Constructor>
onlyOwner
transferOwnership
renounceOwnership
owner
_msgSender
LightchainAI
<Constructor>
name
symbol
decimals
totalSupply
balanceOf
transfer
allowance
decreaseAllowance
increaseAllowance
transferFrom
approve
enableTrading
setWhitelist
_transfer
_approve
Context
_msgSender
_msgData
IERC20 (iface)
totalSupply
balanceOf
transfer
allowance
approve
transferFrom

Summary

Lightchain AI contract implements a token mechanism. This audit investigates security issues, business logic concerns and potential improvements. There are some functions that can be abused by the owner like stop transactions. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats.

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Cyberscope is a blockchain cybersecurity company that was founded with the vision to make web3.0 a safer place for investors and developers. Since its launch, it has worked with thousands of projects and is estimated to have secured tens of millions of investors' funds.

Cyberscope is one of the leading smart contract audit firms in the crypto space and has built a high-profile network of clients and partners.

The Cyberscope team

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