Cyberscope

Audit Report
Wily Coyote

July 2023

Network	ETH
Address	0xB7E93db20F0179bd846DCc1C379a03831DB107e7
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
●	RES	Redundant Event Statement	Unresolved
●	RSW	Redundant Storage Writes	Unresolved
●	PAV	Pair Address Validation	Unresolved
●	FSA	Fixed Swap Address	Unresolved
●	RCS	Redundant Conditional Statement	Unresolved
●	UFM	Unused Fee/Swap Mechanism	Unresolved
●	MEE	Missing Events Emission	Unresolved
●	IDI	Immutable Declaration Improvement	Unresolved
●	L04	Conformance to Solidity Naming Conventions	Unresolved
●	L09	Dead Code Elimination	Unresolved
●	L16	Validate Variable Setters	Unresolved

Table of Contents

Review

Contract Name	WILY
Compiler Version	v0.8.19+commit.7dd6d404
Optimization	200 runs
Explorer	https://etherscan.io/address/0xb7e93db20f0179bd846dcc1c379a03831db107e7
Address	0xb7e93db20f0179bd846dcc1c379a03831db107e7
Network	ETH
Symbol	WILY
Decimals	18
Total Supply	1,000,000,000

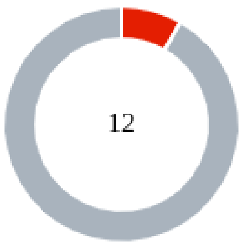
Audit Updates

Initial Audit	06 Jul 2023 https://github.com/cyberscope-io/audits/blob/main/wily/v1/audit.pdf
Corrected Phase 2	10 Jul 2023

Source Files

Filename	SHA256
WILY.sol	30b98bdc29d3dc8882489a3353f3be58e7968c5ab7999ab2dfde8e3e992e4fd8

Findings Breakdown



●	Critical	1
●	Medium	0
●	Minor / Informative	11

Severity		Unresolved	Acknowledged	Resolved	Other
●	Critical	1	0	0	0
●	Medium	0	0	0	0
●	Minor / Informative	11	0	0	0

ST - Stops Transactions

Criticality	Critical
Location	WILY.sol#L303
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.

```
function _transfer(address from, address to, uint256 amount)
internal returns  (bool) {
  bool takeFee = true;
  require(to != address(0), "ERC20: transfer to the zero
address");
  require(from != address(0), "ERC20: transfer from the zero
address");
  require(amount > 0, "Transfer amount must be greater than
zero");

  if (isLimitedAddress(from,to)) {
      require(isTradingEnabled,"Trading is not enabled");
  }
  ...
}
```

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.

RES - Redundant Event Statement

Criticality	Minor / Informative
Location	WILY.sol#L197
Status	Unresolved

Description

There are code segments that could be optimized. A segment may be optimized so that it becomes a smaller size, consumes less memory, executes more rapidly, or performs fewer operations.

The `_changeThreshold` event statement is not used in the contract's implamantation.

```
event _changeThreshold(uint256 newThreshold);
```

Recommendation

The team is advised to take these segments into consideration and rewrite them so the runtime will be more performant. That way it will improve the efficiency and performance of the source code and reduce the cost of executing it. It is recommend removing the unused event statement from the contract..

RSW - Redundant Storage Writes

Criticality	Minor / Informative
Location	WILY.sol#L259
Status	Unresolved

Description

There are code segments that could be optimized. A segment may be optimized so that it becomes a smaller size, consumes less memory, executes more rapidly, or performs fewer operations.

The contract updates state variables even if its current state is the same as the one passed as an argument. As a result, the contract performs redundant storage writes.

```
function setNoFeeWallet(address account, bool enabled) public
onlyOwner {
    _noFee[account] = enabled;
}
```

Recommendation

The team is advised to take these segments into consideration and rewrite them so the runtime will be more performant. That way it will improve the efficiency and performance of the source code and reduce the cost of executing it.

PAV - Pair Address Validation

Criticality	Minor / Informative
Location	WILY.sol#L292
Status	Unresolved

Description

The contract is missing address validation in the pair address argument. The absence of validation reveals a potential vulnerability, as it lacks proper checks to ensure the integrity and validity of the pair address provided as an argument. The pair address is a parameter used in certain methods of decentralized exchanges for functions like token swaps and liquidity provisions.

The absence of address validation in the pair address argument can introduce security risks and potential attacks. Without proper validation, if the owner's address is compromised, the contract may lead to unexpected behavior like loss of funds.

```
function changeLpPair(address newPair) external onlyOwner {
    isLpPair[newPair] = true;
    emit _changePair(newPair);
}
```

Recommendation

To mitigate the risks associated with the absence of address validation in the pair address argument, it is recommended to implement comprehensive address validation mechanisms. A recommended approach could be to verify pair existence in the decentralized application. Prior to interacting with the pair address contract, perform checks to verify the existence and validity of the contract at the provided address. This can be achieved by querying the provider's contract or utilizing external libraries that provide contract verification services.

FSA - Fixed Swap Address

Criticality	Minor / Informative
Location	WILY.sol#L201
Status	Unresolved

Description

The swap address is assigned once and it can not be changed. It is a common practice in decentralized exchanges to create new swap versions. A contract that cannot change the swap address may not be able to catch up to the upgrade. As a result, the contract will not be able to migrate to a new liquidity pool pair or decentralized exchange.

```
constructor () {
    _noFee[msg.sender] = true;

    if (block.chainid == 56) {
        swapRouter =
IRouter02(0x10ED43C718714eb63d5aA57B78B54704E256024E);
    } else if (block.chainid == 97) {
        swapRouter =
IRouter02(0xD99D1c33F9fC3444f8101754aBC46c52416550D1);
    } else if (block.chainid == 1 || block.chainid == 4 ||
block.chainid == 3) {
        swapRouter =
IRouter02(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);
    } else if (block.chainid == 43114) {
        swapRouter =
IRouter02(0x60aE616a2155Ee3d9A68541Ba4544862310933d4);
    } else if (block.chainid == 250) {
        swapRouter =
IRouter02(0xF491e7B69E4244ad4002BC14e878a34207E38c29);
    } else {
        revert("Chain not valid");
    }
    ...
}
```

Recommendation

The team is advised to add the ability to change the pair and router address in order to cover potential liquidity pool migrations. It would be better to support multiple pair addresses so the token will be able to have the same behavior in all the decentralized liquidity pairs.

RCS - Redundant Conditional Statement

Criticality	Minor / Informative
Location	WILY.sol#L148,149
Status	Unresolved

Description

There are code segments that could be optimized. A segment may be optimized so that it becomes a smaller size, consumes less memory, executes more rapidly, or performs fewer operations.

The variable `_totalSupply` is initialized on the contract's constructor, which means its value is always greater than zero. Hence, the conditional statement is redundant.

```
function totalSupply() external pure override returns (uint256)
{ if (_totalSupply == 0) { revert(); } return _totalSupply; }
function decimals() external pure override returns (uint8) { if
(_totalSupply == 0) { revert(); } return _decimals; }
```

Recommendation

The team is advised to take these segments into consideration and rewrite them so the runtime will be more performant. That way it will improve the efficiency and performance of the source code and reduce the cost of executing it.

UFM - Unused Fee/Swap Mechanism

Criticality	Minor / Informative
Location	WILY.sol#L163,168
Status	Unresolved

Description

There are code segments that could be optimized. A segment may be optimized so that it becomes a smaller size, consumes less memory, executes more rapidly, or performs fewer operations.

The contract's fees are set to zero and are immutable. While the contract declares variables and functions related to the fee and swap mechanism, these mechanisms are not utilized within the transaction flow. Consequently, these variables and functions become redundant and serve no purpose within the contract.

```
uint256 constant public swapThreshold = _totalSupply / 20_000;
uint256 constant public buyfee = 0;
uint256 constant public sellfee = 0;
uint256 constant public transferfee = 0;
uint256 constant public fee_denominator = 1_000;
bool private canSwapFees = true;

mapping (address => bool) private isPresaleAddress;

bool private inSwap;

if(is_sell(from, to) &&  !inSwap && canSwap(from, to)) {
    uint256 contractTokenBalance = balanceOf(address(this));
    if(contractTokenBalance >= swapThreshold) {
internalSwap(contractTokenBalance); }
}

if (_noFee[from] || _noFee[to]){
    takeFee = false;
}
balance[from] -= amount; uint256 amountAfterFee = (takeFee) ?
takeTaxes(from, is_buy(from, to), is_sell(from, to), amount) :
amount;
balance[to] += amountAfterFee; emit Transfer(from, to,

amountAfterFee);
```

Recommendation

The team is advised to take these segments into consideration and rewrite them so the runtime will be more performant. That way it will improve the efficiency and performance of the source code and reduce the cost of executing it.

MEE - Missing Events Emission

Criticality	Minor / Informative
Location	WILY.sol#L259
Status	Unresolved

Description

The contract performs actions and state mutations from external methods that do not result in the emission of events. Emitting events for significant actions is important as it allows external parties, such as wallets or dApps, to track and monitor the activity on the contract. Without these events, it may be difficult for external parties to accurately determine the current state of the contract.

```
function setNoFeeWallet(address account, bool enabled) public
onlyOwner {
    _noFee[account] = enabled;
}
```

Recommendation

It is recommended to include events in the code that are triggered each time a significant action is taking place within the contract. These events should include relevant details such as the user's address and the nature of the action taken. By doing so, the contract will be more transparent and easily auditable by external parties. It will also help prevent potential issues or disputes that may arise in the future.

IDI - Immutable Declaration Improvement

Criticality	Minor / Informative
Location	WILY.sol#L205,221
Status	Unresolved

Description

The contract declares state variables that their value is initialized once in the constructor and are not modified afterwards. The `immutable` is a special declaration for this kind of state variables that saves gas when it is defined.

```
swapRouter
lpPair
```

Recommendation

By declaring a variable as immutable, the Solidity compiler is able to make certain optimizations. This can reduce the amount of storage and computation required by the contract, and make it more gas-efficient.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	WILY.sol#L69,178,179,180,193,194,195,196,197,198,271,276,281
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.

```
function WETH() external pure returns (address);
string constant private _name = "Wily Coyote"
string constant private _symbol = "WILY"
uint8 constant private _decimals = 18
event _enableTrading();
event _setPresaleAddress(address account, bool enabled);
event _toggleCanSwapFees(bool enabled);
event _changePair(address newLpPair);
event _changeThreshold(uint256 newThreshold);
event _changeWallets(address marketing);

function is_buy(address ins, address out) internal view returns
(bool) {
        bool _is_buy = !isLpPair[out] && isLpPair[ins];
        return _is_buy;
    }

...
```

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/v0.8.17/style-guide.html#naming-convention.

L09 - Dead Code Elimination

Criticality	Minor / Informative
Location	WILY.sol#L281
Status	Unresolved

Description

In Solidity, dead code is code that is written in the contract, but is never executed or reached during normal contract execution. Dead code can occur for a variety of reasons, such as:

- Conditional statements that are always false.
- Functions that are never called.
- Unreachable code (e.g., code that follows a return statement).

Dead code can make a contract more difficult to understand and maintain, and can also increase the size of the contract and the cost of deploying and interacting with it.

```
function is_transfer(address ins, address out) internal view
returns (bool) {
        bool _is_transfer = !isLpPair[out] && !isLpPair[ins];
        return _is_transfer;
    }
```

Recommendation

To avoid creating dead code, it's important to carefully consider the logic and flow of the contract and to remove any code that is not needed or that is never executed. This can help improve the clarity and efficiency of the contract.

L16 - Validate Variable Setters

Criticality	Minor / Informative
Location	WILY.sol#L330
Status	Unresolved

Description

The contract performs operations on variables that have been configured on user-supplied input. These variables are missing of proper check for the case where a value is zero. This can lead to problems when the contract is executed, as certain actions may not be properly handled when the value is zero.

```
marketingAddress = payable(marketing)
```

Recommendation

By adding the proper check, the contract will not allow the variables to be configured with zero value. This will ensure that the contract can handle all possible input values and avoid unexpected behavior or errors. Hence, it can help to prevent the contract from being exploited or operating unexpectedly.

Functions Analysis

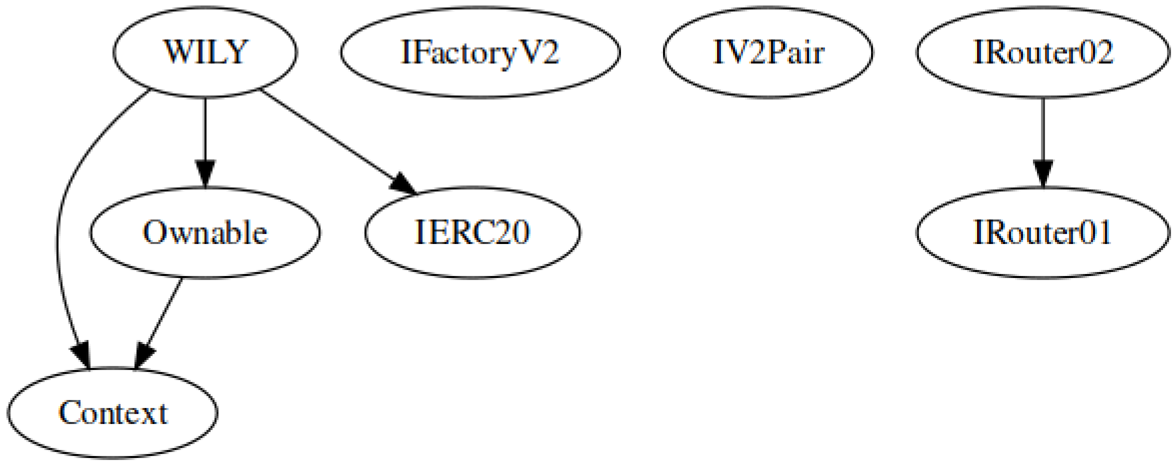
Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
Context	Implementation			
		Public	✓	-
	_msgSender	Internal		
	_msgData	Internal		
Ownable	Implementation	Context		
		Public	✓	-
	owner	Public		-
	renounceOwnership	Public	✓	onlyOwner
	transferOwnership	Public	✓	onlyOwner
	_setOwner	Private	✓	
IFactoryV2	Interface			
	getPair	External		-
	createPair	External	✓	-
IV2Pair	Interface			
	factory	External		-

	getReserves	External		-
	sync	External	✓	-
IRouter01	Interface			
	factory	External		-
	WETH	External		-
	addLiquidityETH	External	Payable	-
	addLiquidity	External	✓	-
	swapExactETHForTokens	External	Payable	-
	getAmountsOut	External		-
	getAmountsIn	External		-
IRouter02	Interface	IRouter01		
	swapExactTokensForETHSupportingFeeOnTransferTokens	External	✓	-
	swapExactETHForTokensSupportingFeeOnTransferTokens	External	Payable	-
	swapExactTokensForTokensSupportingFeeOnTransferTokens	External	✓	-
	swapExactTokensForTokens	External	✓	-
IERC20	Interface			
	totalSupply	External		-
	decimals	External		-
	symbol	External		-
	name	External		-

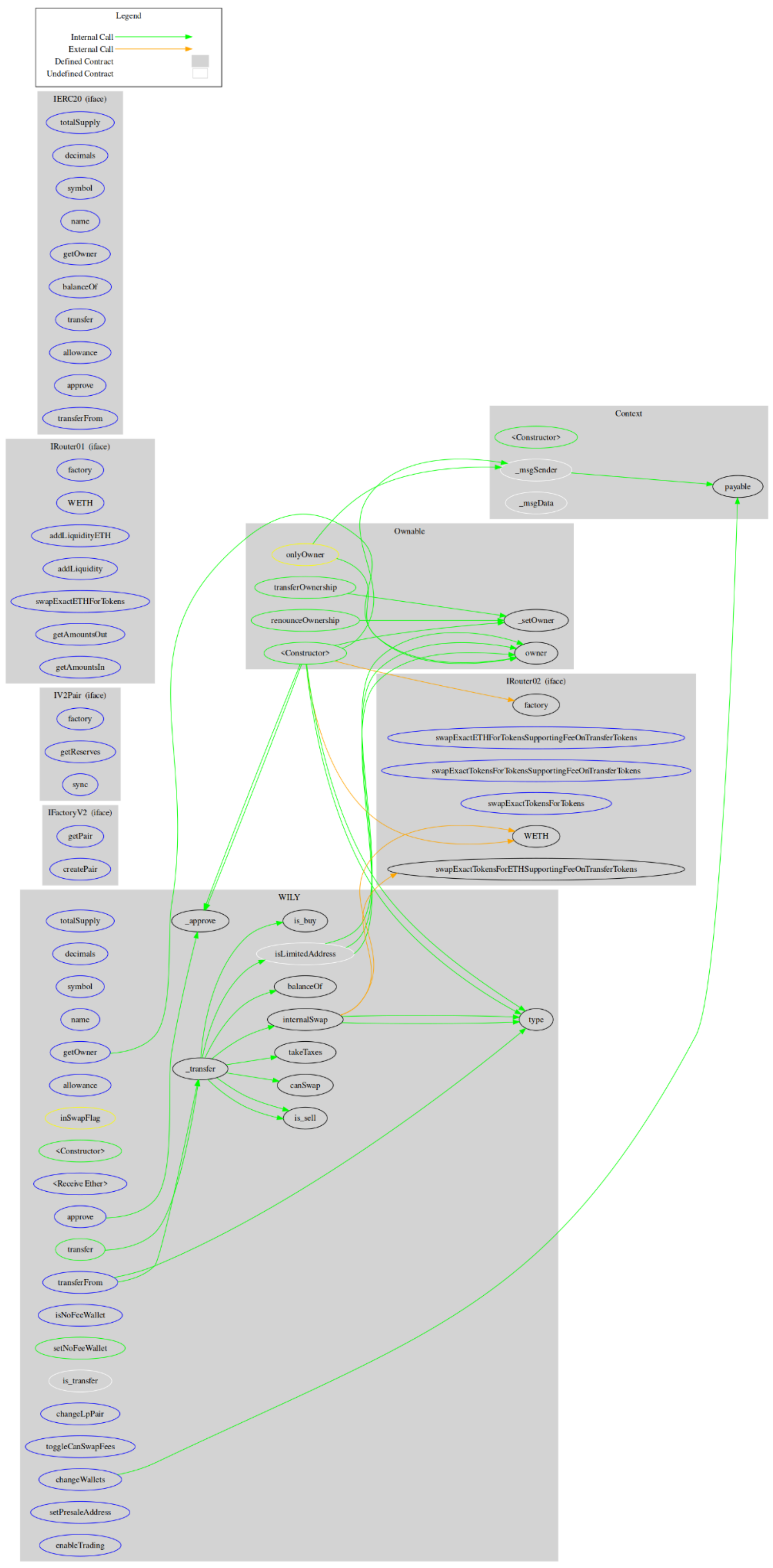
	getOwner	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
WILY	Implementation	Context, Ownable, IERC20		
	totalSupply	External		-
	decimals	External		-
	symbol	External		-
	name	External		-
	getOwner	External		-
	allowance	External		-
	balanceOf	Public		-
		Public	✓	-
		External	Payable	-
	transfer	Public	✓	-
	approve	External	✓	-
	_approve	Internal	✓	
	transferFrom	External	✓	-
	isNoFeeWallet	External		-
	setNoFeeWallet	Public	✓	onlyOwner

	isLimitedAddress	Internal		
	is_buy	Internal		
	is_sell	Internal		
	is_transfer	Internal		
	canSwap	Internal		
	changeLpPair	External	✓	onlyOwner
	toggleCanSwapFees	External	✓	onlyOwner
	_transfer	Internal	✓	
	changeWallets	External	✓	onlyOwner
	takeTaxes	Internal	✓	
	internalSwap	Internal	✓	inSwapFlag
	setPresaleAddress	External	✓	onlyOwner
	enableTrading	External	✓	onlyOwner

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
IERC20 (iface)
totalSupply
decimals
symbol
name
getOwner
balanceOf
transfer
allowance
approve
transferFrom
IRouter01 (iface)
factory
WETH
addLiquidityETH
addLiquidity
swapExactETHForTokens
getAmountsOut
getAmountsIn
IV2Pair (iface)
factory
getReserves
sync
IFactoryV2 (iface)
getPair
createPair
Context
<Constructor>
_msgSender
_msgData
payable
Ownable
onlyOwner
transferOwnership
renounceOwnership
<Constructor>
_setOwner
owner
IRouter02 (iface)
factory
swapExactETHForTokensSupportingFeeOnTransferTokens
swapExactTokensForTokensSupportingFeeOnTransferTokens
swapExactTokensForTokens
WETH
swapExactTokensForETHSupportingFeeOnTransferTokens
WILY
totalSupply
decimals
symbol
name
getOwner
allowance
inSwapFlag
<Constructor>
<Receive Ether>
approve
transfer
transferFrom
isNoFeeWallet
setNoFeeWallet
is_transfer
changeLpPair
toggleCanSwapFees
changeWallets
setPresaleAddress
enableTrading
_approve
is_buy
isLimitedAddress
balanceOf
internalSwap
takeTaxes
canSwap
is_sell
_transfer
type

Summary

Wily Coyote 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 will eliminate all the contract threats.

Disclaimer

About Cyberscope

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

https://www.cyberscope.io