Cyberscope

Audit Report

Sonic The Hotdog

August 2023

SHA256 2fa541e81053a8d7578c72c2caabd0be5388277e8f4dc8f2f356cb317bb928f5

Audited by © cyberscope

Analysis

● Critical ● Medium ● Minor / Informative ● Pass

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

Diagnostics

● Critical ● Medium ● Minor / Informative

Severity	Code	Description	Status
Critical	EPC	Existing Pair Creation	Unresolved
Minor / Informative	MEM	Misleading Error Messages	Unresolved
Minor / Informative	FSA	Fixed Swap Address	Unresolved
Minor / Informative	RSW	Redundant Storage Writes	Unresolved
Minor / Informative	MEE	Missing Events Emission	Unresolved
Minor / Informative	AOI	Arithmetic Operations Inconsistency	Unresolved
Minor / Informative	RSML	Redundant SafeMath Library	Unresolved
Minor / Informative	IDI	Immutable Declaration Improvement	Unresolved
Minor / Informative	L02	State Variables could be Declared Constant	Unresolved
Minor / Informative	L04	Conformance to Solidity Naming Conventions	Unresolved
Minor / Informative	L17	Usage of Solidity Assembly	Unresolved

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Review

Testing Deploy	https://testnet.bscscan.com/address/0x4c65d5d9563959c89a843d49ffccf5c334f8967d

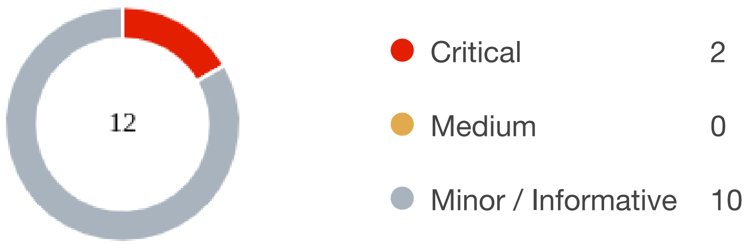
Audit Updates

Initial Audit	16 Aug 2023

Source Files

Filename	SHA256
contracts/HOTDOG.sol	2fa541e81053a8d7578c72c2caabd0be5388277e8f4dc8f2f356cb317bb928f5

Findings Breakdown



Severity	Unresolved	Acknowledged	Resolved	Other
Critical	2	0	0	0
Medium	0	0	0	0
Minor / Informative	10	0	0	0

BC - Blacklists Addresses

Criticality	Critical
Location	contracts/HOTDOG.sol#L214,297
Status	Unresolved

Description

The contract owner has the authority to stop addresses from transactions. The owner may take advantage of it by calling the `addBots` function.

```
   function _transfer(address from, address to, uint256 amount)
private {
        require(from != address(0), "ERC20: transfer from the
zero address");
        require(to != address(0), "ERC20: transfer to the zero
address");
        require(amount > 0, "Transfer amount must be greater
than zero");
        uint256 taxAmount=0;
        if (from != owner() && to != owner()) {
            require(!bots[from] && !bots[to]);
      ..
    }

    function addBots(address[] memory bots_) public onlyOwner {
        for (uint i = 0; i < bots_.length; i++) {
            bots[bots_[i]] = true;
        }
    }

    function delBots(address[] memory notbot) public onlyOwner
{
      for (uint i = 0; i < notbot.length; i++) {
          bots[notbot[i]] = false;
      }
    }
```

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 time-locker mechanism with a reasonable delay.
- Introduce a multi-sign wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.
- Renouncing the ownership will eliminate the threats but it is non-reversible.

EPC - Existing Pair Creation

Criticality	Critical
Location	contracts/HOTDOG.sol#L313
Status	Unresolved

Description

The contract is using the `openTrading` function to open trading and create a new pair on the exchange, approving the router for the total supply of tokens, and adding liquidity. However, the function does not handle the scenario where a pair already exists prior to its execution. If a pair for the given tokens has already been established, the `createPair` function will revert and not proceed with the creation of a new pair. As a result, if a pair has been previously set up before the `openTrading` function is invoked, the contract will encounter an error when trying to call the `createPair` function within `openTrading`. This will prevent the successful execution of the `openTrading` function, effectively causing the contract to be stuck indefinitely and unable to initiate trading.

```
    function openTrading() external onlyOwner() {
        require(!tradingOpen,"trading is already open");
        uniswapV2Router =
IUniswapV2Router02(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);
        _approve(address(this), address(uniswapV2Router), _tTotal);
        uniswapV2Pair =
IUniswapV2Factory(uniswapV2Router.factory()).createPair(address(this),
uniswapV2Router.WETH());
        uniswapV2Router.addLiquidityETH{value:
address(this).balance}(address(this),balanceOf(address(this)),0,0,owner(
),block.timestamp);
        IERC20(uniswapV2Pair).approve(address(uniswapV2Router),
type(uint).max);
        swapEnabled = true;
        tradingOpen = true;
        firstBlock = block.number;
    }
```

Recommendation

It is recommended to add a check to the `openTrading` function to verify if a pair already exists. This can be done by calling the `getPair` function of the Uniswap V2 Factory contract. If the `getPair` function returns the zero address, it means that the pair does not exist and the `createPair` function can be safely called. This will prevent the contract from getting stuck in case a pair is already created before the `openTrading` function is called.

MEM - Misleading Error Messages

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol#L223,231
Status	Unresolved

Description

The contract is using misleading error messages. These error messages do not accurately reflect the problem, making it difficult to identify and fix the issue. As a result, the users will not be able to find the root cause of the error.

```
require(!bots[from] && !bots[to]);
require(!isContract(to));
```

Recommendation

The team is suggested to provide a descriptive message to the errors. This message can be used to provide additional context about the error that occurred or to explain why the contract execution was halted. This can be useful for debugging and for providing more information to users that interact with the contract.

FSA - Fixed Swap Address

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol#L313
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.

```
function openTrading() external onlyOwner() {
    ...
    uniswapV2Router =
IUniswapV2Router02(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);
    _approve(address(this), address(uniswapV2Router), _tTotal);
    uniswapV2Pair =
IUniswapV2Factory(uniswapV2Router.factory()).createPair(address(t
his), uniswapV2Router.WETH());
    uniswapV2Router.addLiquidityETH{value:
address(this).balance}(address(this),balanceOf(address(this)),0,0
,owner(),block.timestamp);
    IERC20(uniswapV2Pair).approve(address(uniswapV2Router),
type(uint).max);
    ...
    }
```

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.

RSW - Redundant Storage Writes

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol#L300
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 the bots status of an account 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 addBots(address[] memory bots_) public onlyOwner {
        for (uint i = 0; i < bots_.length; i++) {
            bots[bots_[i]] = true;
        }
    }

    function delBots(address[] memory notbot) public onlyOwner
{
      for (uint i = 0; i < notbot.length; i++) {
          bots[notbot[i]] = false;
      }
    }
```

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	contracts/HOTDOG.sol#L300
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 addBots(address[] memory bots_) public onlyOwner {
        for (uint i = 0; i < bots_.length; i++) {
            bots[bots_[i]] = true;
        }
    }

    function delBots(address[] memory notbot) public onlyOwner
{
      for (uint i = 0; i < notbot.length; i++) {
          bots[notbot[i]] = false;
      }
    }
```

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.

AOI - Arithmetic Operations Inconsistency

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol#L228
Status	Unresolved

Description

The contract uses both the SafeMath library and native arithmetic operations. The SafeMath library is commonly used to mitigate vulnerabilities related to integer overflow and underflow issues. However, it was observed that the contract also employs native arithmetic operators (such as +, -, *, /) in certain sections of the code.

The combination of SafeMath library and native arithmetic operations can introduce inconsistencies and undermine the intended safety measures. This discrepancy creates an inconsistency in the contract's arithmetic operations, increasing the risk of unintended consequences such as inconsistency in error handling, or unexpected behavior.

```
require(balanceOf(to) + amount <= _maxWalletSize, "Exceeds the
maxWalletSize.");
firstBlock + 3  > block.number
require(balanceOf(to) + amount <= _maxWalletSize, "Exceeds the
maxWalletSize.");

_balances[address(this)]=_balances[address(this)].add(taxAmount
);
_balances[to]=_balances[to].add(amount.sub(taxAmount));
```

Recommendation

To address this finding and ensure consistency in arithmetic operations, it is recommended to standardize the usage of arithmetic operations throughout the contract. The contract should be modified to either exclusively use SafeMath library functions or entirely rely on native arithmetic operations, depending on the specific requirements and design considerations. This consistency will help maintain the contract's integrity and mitigate potential vulnerabilities arising from inconsistent arithmetic operations.

RSML - Redundant SafeMath Library

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol
Status	Unresolved

Description

SafeMath is a popular Solidity library that provides a set of functions for performing common arithmetic operations in a way that is resistant to integer overflows and underflows.

Starting with Solidity versions that are greater than or equal to 0.8.0, the arithmetic operations revert to underflow and overflow. As a result, the native functionality of the Solidity operations replaces the SafeMath library. Hence, the usage of the SafeMath library adds complexity, overhead and increases gas consumption unnecessarily.

```
library SafeMath {...}
```

Recommendation

The team is advised to remove the SafeMath library. Since the version of the contract is greater than `0.8.0` then the pure Solidity arithmetic operations produce the same result.

If the previous functionality is required, then the contract could exploit the `unchecked { ... }` statement.

Read more about the breaking change on https://docs.soliditylang.org/en/v0.8.16/080-breaking-changes.html#solidity-v0-8-0-breaking-changes.

IDI - Immutable Declaration Improvement

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol#L158
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.

```
_taxWallet
```

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.

L02 - State Variables could be Declared Constant

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol#L125,126,127,128,129,130,131,140,141
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.

```
uint256 private _initialBuyTax = 20
uint256 private _initialSellTax = 20
uint256 private _finalBuyTax = 4
uint256 private _finalSellTax = 4
uint256 private _reduceBuyTaxAt = 25
uint256 private _reduceSellTaxAt = 25
uint256 private _preventSwapBefore = 25
uint256 public _taxSwapThreshold = 200000 * 10 ** _decimals
uint256 public _maxTaxSwap = 1000000 * 10 ** _decimals
```

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	contracts/HOTDOG.sol#L105,134,135,136,137,138,139,140,141
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);
uint8 private constant _decimals = 9
uint256 private constant _tTotal = 100000000 * 10 ** _decimals
string private constant _name = unicode"Sonic The Hotdog"
string private constant _symbol = unicode"HOTDOG"
uint256 public _maxTxAmount = 2000000 * 10 ** _decimals
uint256 public _maxWalletSize = 2000000 * 10 ** _decimals
uint256 public _taxSwapThreshold = 200000 * 10 ** _decimals
uint256 public _maxTaxSwap = 1000000 * 10 ** _decimals
```

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.

L17 - Usage of Solidity Assembly

Criticality	Minor / Informative
Location	contracts/HOTDOG.sol#L267
Status	Unresolved

Description

Using assembly can be useful for optimizing code, but it can also be error-prone. It's important to carefully test and debug assembly code to ensure that it is correct and does not contain any errors.

Some common types of errors that can occur when using assembly in Solidity include Syntax, Type, Out-of-bounds, Stack, and Revert.

```
assembly {
                size := extcodesize(account)
          }
```

Recommendation

It is recommended to use assembly sparingly and only when necessary, as it can be difficult to read and understand compared to Solidity code.

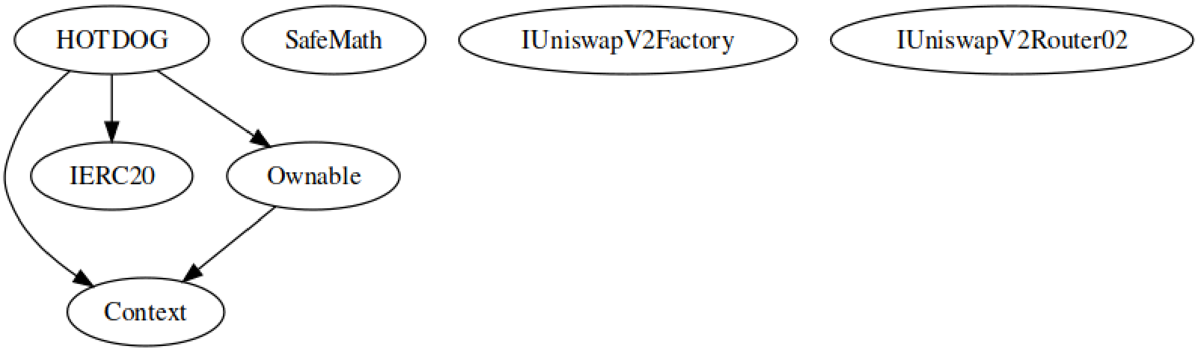
Functions Analysis

Contract	Type	Bases		
	Function Name	Visibility	Mutability	Modifiers
Context	Implementation			
	_msgSender	Internal		
IERC20	Interface			
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
SafeMath	Library			
	add	Internal		
	sub	Internal		
	sub	Internal		
	mul	Internal		
	div	Internal		
	div	Internal		

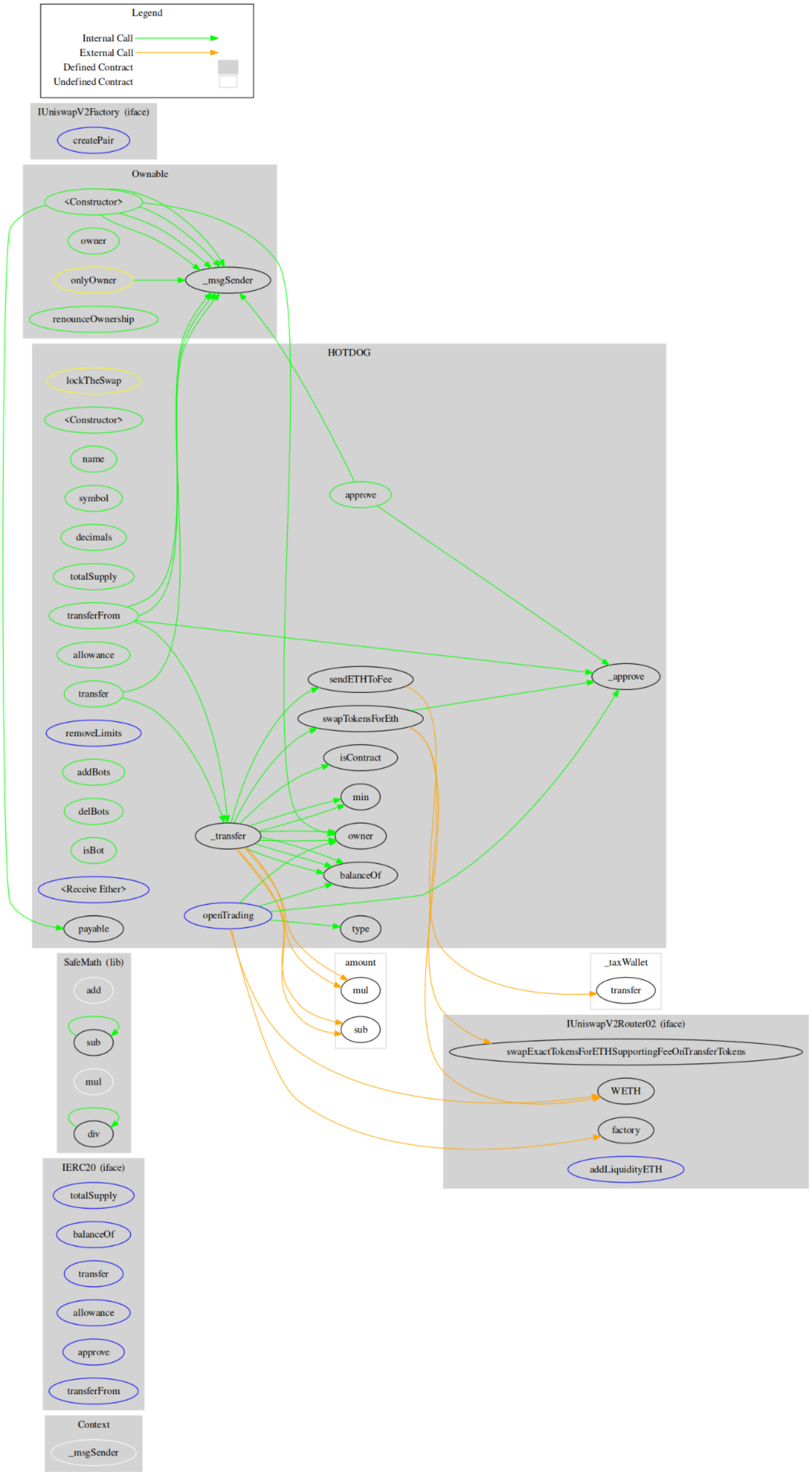
Ownable	Implementation	Context		
		Public	✓	-
	owner	Public		-
	renounceOwnership	Public	✓	onlyOwner
IUniswapV2Factory	Interface			
	createPair	External	✓	-
IUniswapV2Router02	Interface			
	swapExactTokensForETHSupportingFeeOnTransferTokens	External	✓	-
	factory	External		-
	WETH	External		-
	addLiquidityETH	External	Payable	-
HOTDOG	Implementation	Context, IERC20, Ownable		
		Public	✓	-
	name	Public		-
	symbol	Public		-
	decimals	Public		-
	totalSupply	Public		-
	balanceOf	Public		-

	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	_approve	Private	✓	
	_transfer	Private	✓	
	min	Private		
	isContract	Private		
	swapTokensForEth	Private	✓	lockTheSwap
	removeLimits	External	✓	onlyOwner
	sendETHToFee	Private	✓	
	addBots	Public	✓	onlyOwner
	delBots	Public	✓	onlyOwner
	isBot	Public		-
	openTrading	External	✓	onlyOwner
		External	Payable	-

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
IUniswapV2Factory (iface)
createPair
Ownable
<Constructor>
owner
onlyOwner
_msgSender
renounceOwnership
HOTDOG
lockTheSwap
<Constructor>
name
symbol
decimals
totalSupply
transferFrom
allowance
transfer
removeLimits
addBots
delBots
isBot
<Receive Ether>
payable
approve
_approve
sendETHToFee
swapTokensForEth
isContract
min
_transfer
owner
balanceOf
openTrading
type
SafeMath (lib)
add
sub
mul
div
amount
mul
sub
_taxWallet
transfer
IUniswapV2Router02 (iface)
swapExactTokensForETHSupportingFeeOnTransferTokens
WETH
factory
addLiquidityETH
IERC20 (iface)
totalSupply
balanceOf
transfer
allowance
approve
transferFrom
Context
_msgSender

Summary

Sonic The Hotdog 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 massively blacklist addresses. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats. There is also a limit of max 20% fees.

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Blockchain technology and cryptographic assets present a high level of ongoing risk Cyberscope's position is that each company and individual are responsible for their own due diligence and continuous security Cyberscope'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. The assessment services provided by Cyberscope are subject to dependencies and are under continuing development. 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 Cryptographic tokens are emergent technologies and carry with them high levels of technical risk and uncertainty. The assessment reports could include false positives false negatives and other unpredictable results. The services may access and depend upon multiple layers of third parties.

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