Cyberscope

Audit Report

Bull Coin

June 2023

Network	ETH
Address	0xf84210B3F764fe9F40475C118Ca37d26ceacC80D
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	Unresolved

Diagnostics

Critical Medium Minor / Informative

Severity	Code	Description	Status
	MSC	Missing Sanity Check	Unresolved
	MEE	Missing Events Emission	Unresolved
	RSW	Redundant Storage Writes	Unresolved
	L04	Conformance to Solidity Naming Conventions	Unresolved
	L07	Missing Events Arithmetic	Unresolved
	L09	Dead Code Elimination	Unresolved
	L15	Local Scope Variable Shadowing	Unresolved
	L16	Validate Variable Setters	Unresolved
	L19	Stable Compiler Version	Unresolved

Table of Contents

Review

Contract Name	BullCoin
Compiler Version	v0.8.18+commit.87f61d96
Optimization	200 runs
Explorer	https://etherscan.io/address/0xf84210b3f764fe9f40475c118ca37d26ceacc80d
Address	0xf84210b3f764fe9f40475c118ca37d26ceacc80d
Network	ETH
Symbol	BULLS
Decimals	18
Total Supply	23,000,000,069,420

Audit Updates

Initial Audit	09 Jun 2023

Source Files

Filename	SHA256
bullstoken.sol	3d7a92676fb1bf1b8380d4557152cedfee8c802b47165f135b329a400fab704e

Findings Breakdown

Critical	1
Medium	1
Minor / Informative	9

Severity	Unresolved	Acknowledged	Resolved	Other
Critical	1	0	0	0
Medium	1	0	0	0
Minor / Informative	9	0	0	0

ST - Stops Transactions

Criticality	Medium
Location	bullstoken.sol#L647
Status	Unresolved

Description

The contract owner has the authority to stop the transactions for all users. The owner may take advantage of it by setting the:

- `maxHoldingAmount` to zero.
- `minHoldingAmount` to a large value.

```
if (limited && from == uniswapV2Pair) {
    require(super.balanceOf(to) + amount <= maxHoldingAmount &&
super.balanceOf(to) + amount >= minHoldingAmount, "Forbid");
}
```

Recommendation

The contract could embody a check for not allowing setting the `maxHoldingAmount` less than a reasonable amount or the `minHoldingAmount` more than a reasonable amount. A suggested implementation could check that the minimum/maximum amount should be more than a fixed percentage of the total supply. 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.

BC - Blacklists Addresses

Criticality	Critical
Location	bullstoken.sol#L629
Status	Unresolved

Description

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

```
function blacklist(address _address, bool _isBlacklisting) external
onlyOwner {
    blacklists[_address] = _isBlacklisting;
}
```

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.

MSC - Missing Sanity Check

Criticality	Minor / Informative
Location	bullstoken.sol#L633
Status	Unresolved

Description

The contract is processing variables that have not been properly sanitized and checked that they form the proper shape. These variables may produce vulnerability issues.

The `setRule` function modifies the state of certain variables, including the `maxHoldingAmount` and `minHoldingAmount`. The two variables indicate the maximum and minimum token amount an account can hold respectively. The contract lacks validation that the `minHoldingAmount` is less than the `maxHoldingAmount`.

```
function setRule(bool _limited, address _uniswapV2Pair, uint256 _maxHoldingAmount,
uint256 _minHoldingAmount) external onlyOwner {
    limited = _limited;
    uniswapV2Pair = _uniswapV2Pair;
    maxHoldingAmount = _maxHoldingAmount;
    minHoldingAmount = _minHoldingAmount;
}
```

Recommendation

The team is advised to properly check the variables according to the required specifications.

MEE - Missing Events Emission

Criticality	Minor / Informative
Location	bullstoken.sol#L630
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.

```
blacklists[_address] = _isBlacklisting;
```

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.

RSW - Redundant Storage Writes

Criticality	Minor / Informative
Location	bullstoken.sol#L630,634,635,636,637
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 modifies the state of certain variables without checking if their current state holds the same value as the one given as an argument. As a result, the contract performs redundant storage writes.

```
blacklists[_address] = _isBlacklisting;
limited = _limited;
uniswapV2Pair = _uniswapV2Pair;
maxHoldingAmount = _maxHoldingAmount;
minHoldingAmount = _minHoldingAmount;
```

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.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	bullstoken.sol#L629,633
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.

```
address _address
bool _isBlacklisting
address _uniswapV2Pair
uint256 _maxHoldingAmount
uint256 _minHoldingAmount
bool _limited
```

Recommendation

By following the Solidity naming convention guidelines, the codebase increased the readability, and 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.

L07 - Missing Events Arithmetic

Criticality	Minor / Informative
Location	bullstoken.sol#L636
Status	Unresolved

Description

Events are a way to record and log information about changes or actions that occur within a contract. They are often used to notify external parties or clients about events that have occurred within the contract, such as the transfer of tokens or the completion of a task.

It's important to carefully design and implement the events in a contract, and to ensure that all required events are included. It's also a good idea to test the contract to ensure that all events are being properly triggered and logged.

```
maxHoldingAmount = _maxHoldingAmount
```

Recommendation

By including all required events in the contract and thoroughly testing the contract's functionality, the contract ensures that it performs as intended and does not have any missing events that could cause issues with its arithmetic.

L09 - Dead Code Elimination

Criticality	Minor / Informative
Location	bullstoken.sol#L502
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 _beforeTokenTransfer(
        address from,
        address to,
        uint256 amount
    ) internal virtual {}
```

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.

L15 - Local Scope Variable Shadowing

Criticality	Minor / Informative
Location	bullstoken.sol#L623
Status	Unresolved

Description

Local scope variable shadowing occurs when a local variable with the same name as a variable in an outer scope is declared within a function or code block. When this happens, the local variable "shadows" the outer variable, meaning that it takes precedence over the outer variable within the scope in which it is declared.

```
uint256 _totalSupply
```

Recommendation

It's important to be aware of shadowing when working with local variables, as it can lead to confusion and unintended consequences if not used correctly. It's generally a good idea to choose unique names for local variables to avoid shadowing outer variables and causing confusion.

L16 - Validate Variable Setters

Criticality	Minor / Informative
Location	bullstoken.sol#L635
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.

```
uniswapV2Pair = _uniswapV2Pair
```

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.

L19 - Stable Compiler Version

Criticality	Minor / Informative
Location	bullstoken.sol#L6,90,118,144,533,614
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 ^0.8.0;
```

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.

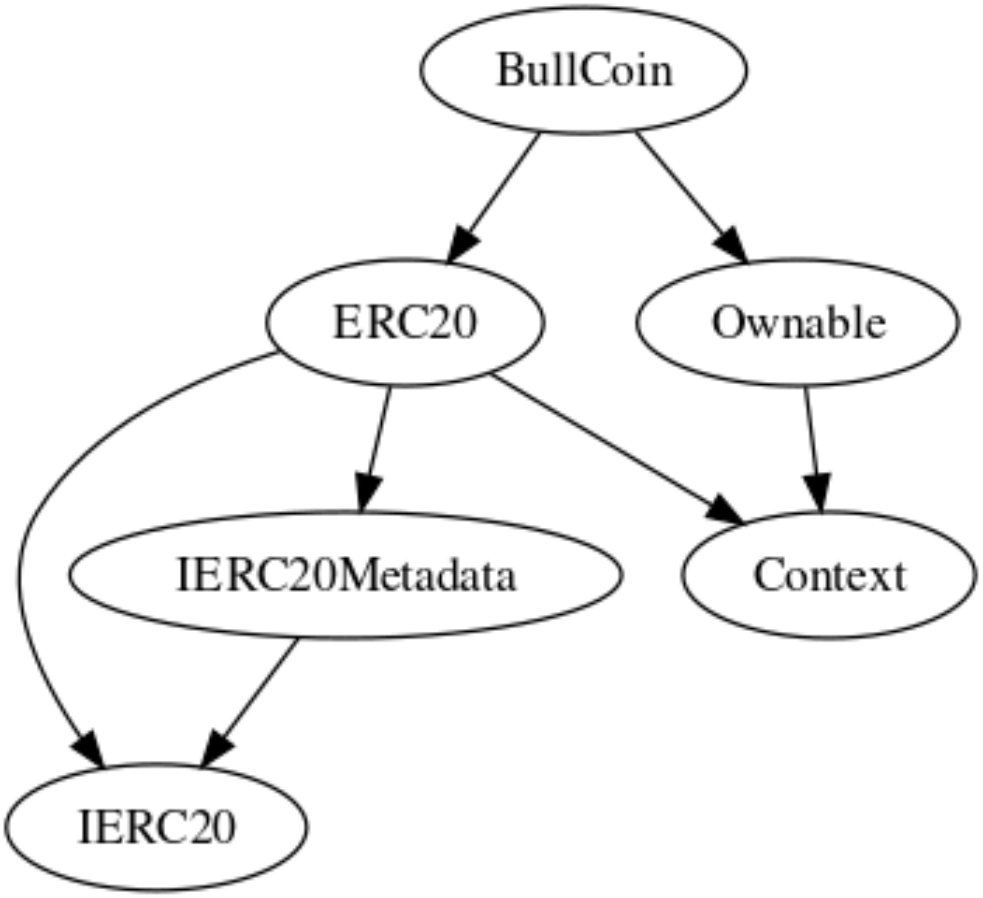
Functions Analysis

Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
IERC20	Interface			
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
IERC20Metadata	Interface	IERC20		
	name	External		-
	symbol	External		-
	decimals	External		-
Context	Implementation			
	_msgSender	Internal		
	_msgData	Internal		

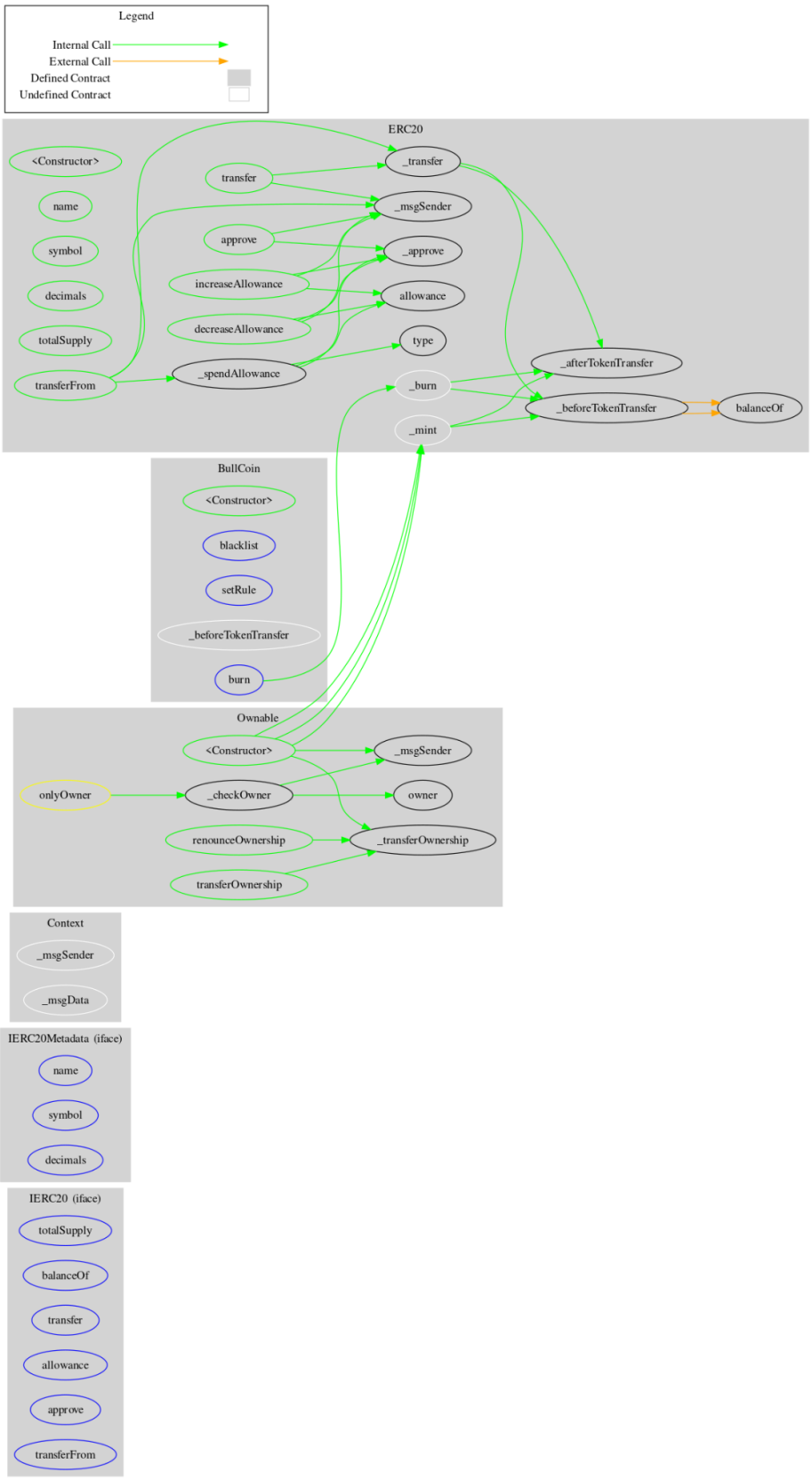
ERC20	Implementation	Context, IERC20, IERC20Metadata		
		Public	✓	-
	name	Public		-
	symbol	Public		-
	decimals	Public		-
	totalSupply	Public		-
	balanceOf	Public		-
	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	increaseAllowance	Public	✓	-
	decreaseAllowance	Public	✓	-
	_transfer	Internal	✓	
	_mint	Internal	✓	
	_burn	Internal	✓	
	_approve	Internal	✓	
	_spendAllowance	Internal	✓	
	_beforeTokenTransfer	Internal	✓	
	_afterTokenTransfer	Internal	✓	
Ownable	Implementation	Context		

		Public	✓	-
	owner	Public		-
	_checkOwner	Internal		
	renounceOwnership	Public	✓	onlyOwner
	transferOwnership	Public	✓	onlyOwner
	_transferOwnership	Internal	✓	
BullCoin	Implementation	Ownable, ERC20		
		Public	✓	ERC20
	blacklist	External	✓	onlyOwner
	setRule	External	✓	onlyOwner
	_beforeTokenTransfer	Internal	✓	
	burn	External	✓	-

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
ERC20
<Constructor>
name
symbol
decimals
totalSupply
transferFrom
transfer
approve
increaseAllowance
decreaseAllowance
_spendAllowance
_transfer
_msgSender
_approve
allowance
type
_burn
_mint
_afterTokenTransfer
_beforeTokenTransfer
balanceOf
BullCoin
<Constructor>
blacklist
setRule
_beforeTokenTransfer
burn
Ownable
<Constructor>
onlyOwner
_checkOwner
renounceOwnership
transferOwnership
_msgSender
owner
_transferOwnership
Context
_msgSender
_msgData
IERC20Metadata (iface)
name
symbol
decimals
IERC20 (iface)
totalSupply
balanceOf
transfer
allowance
approve
transferFrom

Summary

Bull Coin 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 and 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.

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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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