Cyberscope

Audit Report

Migrantcoin

February 2024

Network	BSC
Address	0xC4D7599Ce4c82A27C006c3D623fE0b6063a2A534
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	Unresolved
●	BT	Burns Tokens	Passed
●	BC	Blacklists Addresses	Passed

Diagnostics

Critical Medium Minor / Informative

Severity	Code	Description	Status
●	OCTD	Transfers Contract's Tokens	Unresolved
●	L04	Conformance to Solidity Naming Conventions	Unresolved
●	L09	Dead Code Elimination	Unresolved
●	L16	Validate Variable Setters	Unresolved
●	L17	Usage of Solidity Assembly	Unresolved
●	L18	Multiple Pragma Directives	Unresolved
●	L19	Stable Compiler Version	Unresolved
●	L20	Succeeded Transfer Check	Unresolved

Table of Contents

Review

Contract Name	CoinToken
Compiler Version	v0.8.5+commit.a4f2e591
Optimization	200 runs
Explorer	https://bscscan.com/address/0xc4d7599ce4c82a27c006c3d623fe0b6063a2a534
Address	0xc4d7599ce4c82a27c006c3d623fe0b6063a2a534
Network	BSC
Symbol	MIG
Decimals	7
Total Supply	10,000,000,000,000,000
Badge Eligibility	Must Fix Criticals

Audit Updates

Initial Audit	08 Feb 2024

Source Files

Filename	SHA256
CoinToken.sol	985b42cb858b3ff274cea6febfd64e40bbfed7de8a710cc40be9ef5689a3d19d

Findings Breakdown

Critical	1
Medium	0
Minor / Informative	8

Severity	Unresolved	Acknowledged	Resolved	Other
Critical	1	0	0	0
Medium	0	0	0	0
Minor / Informative	8	0	0	0

MT - Mints Tokens

Criticality	Critical
Location	CoinToken.sol#L1207
Status	Unresolved

Description

The contract owner has the authority to mint tokens. The owner may take advantage of it by calling the `mint` function. As a result, the contract tokens will be highly inflated.

```
function mint(address account, uint256 amount) external canMint
{
    _mint(account, amount);
}

function _mint(address account, uint256 amount) internal
override onlyOwner {
    super._mint(account, amount);
}
```

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.

Temporary Solutions:

These measurements do not decrease the severity of the finding

- Introduce a time-locker mechanism with a reasonable delay.
- Introduce a multi-signature wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.

Permanent Solution:

- Renouncing the ownership, which will eliminate the threats but it is non-reversible.

OCTD - Transfers Contract's Tokens

Criticality	Minor / Informative
Location	CoinToken.sol#L1132
Status	Unresolved

Description

The contract owner has the authority to claim all the balance of the contract. The owner may take advantage of it by calling the `recoverERC20` function.

```
function recoverERC20(address tokenAddress, uint256
tokenAmount) public virtual onlyOwner {
    IERC20(tokenAddress).transfer(owner(), tokenAmount);
}
```

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.

Temporary Solutions:

These measurements do not decrease the severity of the finding

- Introduce a time-locker mechanism with a reasonable delay.
- Introduce a multi-signature wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.

Permanent Solution:

- Renouncing the ownership, which will eliminate the threats but it is non-reversible.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	CoinToken.sol#L1071
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 public _owner
```

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	CoinToken.sol#L541,567,577,592,602,617,627,641,651,659
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 sendValue(address payable recipient, uint256 amount)
internal {
        require(address(this).balance >= amount, "Address:
insufficient balance");

        // solhint-disable-next-line avoid-low-level-calls,
avoid-call-value
        (bool success, ) = recipient.call{ value: amount }("");
        require(success, "Address: unable to send value,
recipient may have reverted");
...
function functionCall(address target, bytes memory data)
internal returns (bytes memory) {
      return functionCall(target, data, "Address: low-level
call failed");
    }

function functionCall(address target, bytes memory data, string
memory errorMessage) internal returns (bytes memory) {
        return functionCallWithValue(target, data, 0,
errorMessage);
    }

...
```

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	CoinToken.sol#L1249,1250
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.

```
payable(feeReceiver_).transfer(msg.value)
_owner   = tokenOwner
```

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.

L17 - Usage of Solidity Assembly

Criticality	Minor / Informative
Location	CoinToken.sol#L521,668
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) }

assembly {
                    let returndata_size := mload(returndata)
                    revert(add(32, returndata),
returndata_size)
                }
```

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.

L18 - Multiple Pragma Directives

Criticality	Minor / Informative
Status	Unresolved

Description

If the contract includes multiple conflicting pragma directives, it may produce unexpected errors. To avoid this, it's important to include the correct pragma directive at the top of the contract and to ensure that it is the only pragma directive included in the contract.

```
pragma solidity ^0.8.0;
```

Recommendation

It is important to include only one pragma directive at the top of the contract and to ensure that it accurately reflects the version of Solidity that the contract is written in.

By including all required compiler options and flags in a single pragma directive, the potential conflicts could be avoided and ensure that the contract can be compiled correctly.

L19 - Stable Compiler Version

Criticality	Minor / Informative
Location	CoinToken.sol#L7,87,116,143,449,491,683,710,740,833,867,899,1056,1118,1141,1168,1234
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.

L20 - Succeeded Transfer Check

Criticality	Minor / Informative
Location	CoinToken.sol#L1133
Status	Unresolved

Description

According to the ERC20 specification, the transfer methods should be checked if the result is successful. Otherwise, the contract may wrongly assume that the transfer has been established.

```
IERC20(tokenAddress).transfer(owner(), tokenAmount)
```

Recommendation

The contract should check if the result of the transfer methods is successful. The team is advised to check the SafeERC20 library from the Openzeppelin library.

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	✓	
	_beforeTokenTransfer	Internal	✓	
ERC20Burnable	Implementation	Context, ERC20		
	burn	Public	✓	-
	burnFrom	Public	✓	-
Address	Library			

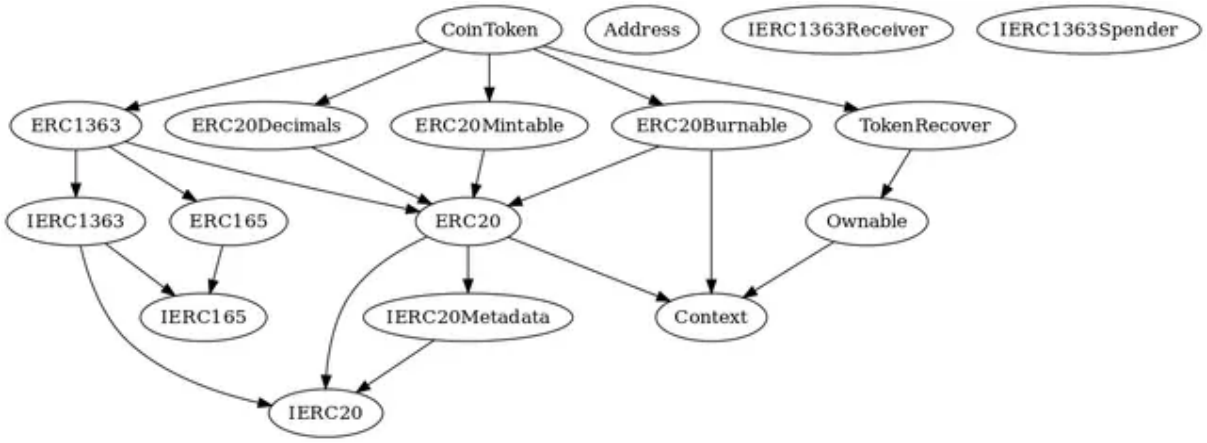
	isContract	Internal		
	sendValue	Internal	✓	
	functionCall	Internal	✓	
	functionCall	Internal	✓	
	functionCallWithValue	Internal	✓	
	functionCallWithValue	Internal	✓	
	functionStaticCall	Internal		
	functionStaticCall	Internal		
	functionDelegateCall	Internal	✓	
	functionDelegateCall	Internal	✓	
	_verifyCallResult	Private		
IERC165	Interface			
	supportsInterface	External		-
ERC165	Implementation	IERC165		
	supportsInterface	Public		-
IERC1363	Interface	IERC20, IERC165		
	transferAndCall	External	✓	-
	transferAndCall	External	✓	-
	transferFromAndCall	External	✓	-
	transferFromAndCall	External	✓	-

	approveAndCall	External	✓	-
	approveAndCall	External	✓	-
IERC1363Receiver	Interface			
	onTransferReceived	External	✓	-
IERC1363Spender	Interface			
	onApprovalReceived	External	✓	-
ERC1363	Implementation	ERC20, IERC1363, ERC165		
	supportsInterface	Public		-
	transferAndCall	Public	✓	-
	transferAndCall	Public	✓	-
	transferFromAndCall	Public	✓	-
	transferFromAndCall	Public	✓	-
	approveAndCall	Public	✓	-
	approveAndCall	Public	✓	-
	_checkAndCallTransfer	Internal	✓	
	_checkAndCallApprove	Internal	✓	
Ownable	Implementation	Context		
	owner	Public		-

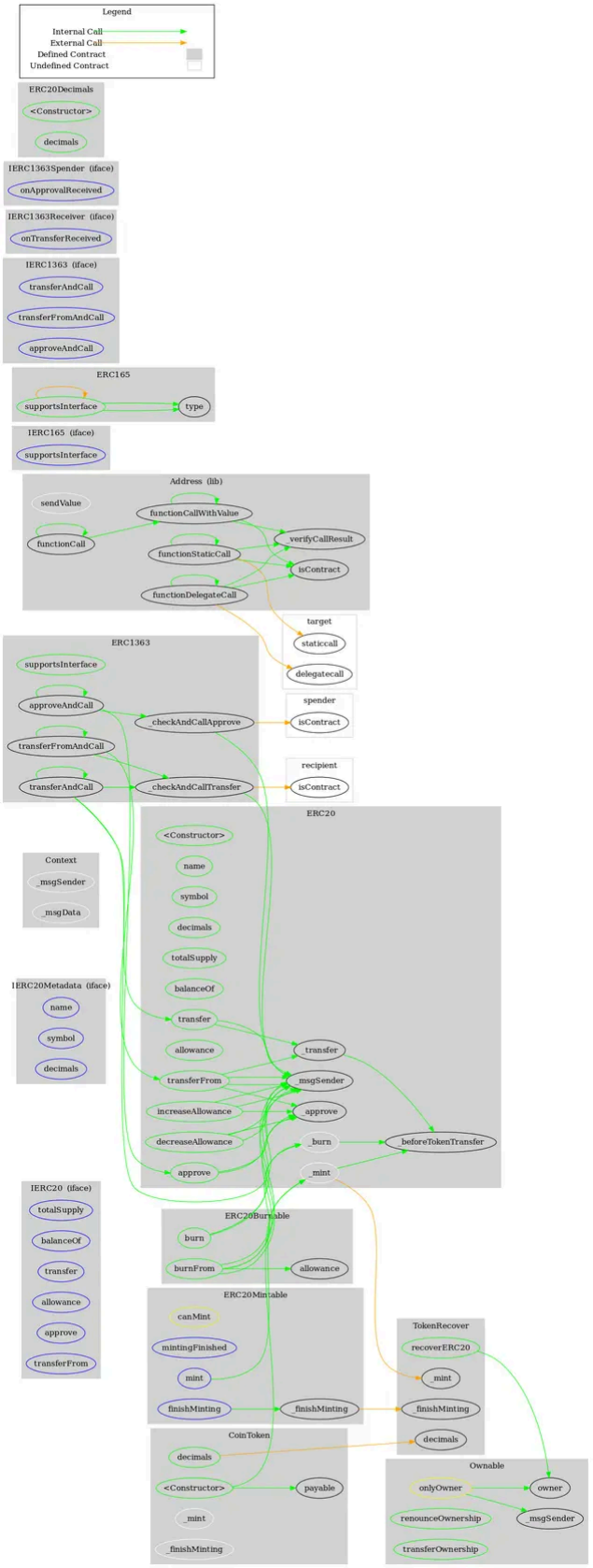
	renounceOwnership	Public	✓	onlyOwner
	transferOwnership	Public	✓	onlyOwner
TokenRecover	Implementation	Ownable		
	recoverERC20	Public	✓	onlyOwner
ERC20Decimals	Implementation	ERC20		
		Public	✓	-
	decimals	Public		-
ERC20Mintable	Implementation	ERC20		
	mintingFinished	External		-
	mint	External	✓	canMint
	finishMinting	External	✓	canMint
	_finishMinting	Internal	✓	
CoinToken	Implementation	ERC20Decimals, ERC20Mintable, ERC20Burnable, ERC1363, TokenRecover		
		Public	Payable	ERC20 ERC20Decimals
	decimals	Public		-
	_mint	Internal	✓	onlyOwner

	_finishMinting	Internal	✓	onlyOwner

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
ERC20Decimals
<Constructor>
decimals
IERC1363Spender (iface)
onApprovalReceived
IERC1363Receiver (iface)
onTransferReceived
IERC1363 (iface)
transferAndCall
transferFromAndCall
approveAndCall
ERC165
supportsInterface
type
IERC165 (iface)
supportsInterface
Address (lib)
sendValue
functionCallWithValue
functionCall
verifyCallResult
functionStaticCall
isContract
functionDelegateCall
target
staticcall
delegatecall
ERC1363
supportsInterface
approveAndCall
checkAndCallApprove
spender
isContract
transferFromAndCall
transferAndCall
checkAndCallTransfer
recipient
isContract
ERC20
<Constructor>
name
symbol
decimals
totalSupply
balanceOf
transfer
allowance
_transfer
transferFrom
msgSender
increaseAllowance
_approve
decreaseAllowance
_burn
beforeTokenTransfer
approve
_mint
Context
_msgSender
_msgData
IERC20Metadata (iface)
name
symbol
decimals
IERC20 (iface)
totalSupply
balanceOf
transfer
allowance
approve
transferFrom
ERC20Burnable
burn
burnFrom
allowance
ERC20Mintable
canMint
mintingFinished
mint
finishMinting
finishMinting
TokenRecover
recoverERC20
_mint
finishMinting
decimals
CoinToken
decimals
<Constructor>
payable
_mint
finishMinting
Ownable
onlyOwner
owner
renounceOwnership
_msgSender
transferOwnership

Summary

Migrantcoin 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 mint tokens. if the contract owner abuses the mint functionality, then the contract will be highly inflated. 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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The Cyberscope team

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