



Smart Contract Audit

FOR
GNUCKLES

DATED : 15 MAY 23'



AUDIT SUMMARY

Project name – KNUCKLES

Date: 15 May, 2023

Scope of Audit- Audit Ace was consulted to conduct the smart contract audit of the solidity source codes.

Audit Status: **Passed**

Issues Found

Status	Critical	High	Medium	Low	Suggestion
Open	0	0	1	0	0
Acknowledged	0	0	0	0	0
Resolved	0	0	0	0	0

USED TOOLS

Tools:

1. Manual Review: The code has undergone a line-by-line review by the **Ace** team.

2. BSC Test Network: All tests were conducted on the BSC Test network, and each test has a corresponding transaction attached to it. These tests can be found in the "Functional Tests" section of the report.

3. Slither: The code has undergone static analysis using Slither.

Testnet version:

The tests were performed using the contract deployed on the BSC Testnet, which can be found at the following address:

<https://testnet.bscscan.com/token/0x5d7fd00ebdd22efdaece3fd6df212202144cc1e3>



Token Information

Name : Knuckles Inu

Symbol : KNUCKLES

Decimals: 9

Network: BSC

Token Type: BEP20

Token Address:

0x2B31C2756c9E7Ddbc9A0FD1C72f222edA93843C1

Owner:

0xe9Caf8681838FADf2A8545160206c436aCADE82
B

Deployer:0xD4454926909cB3819A38550aCddf0Dc
8e9dd1E39



TOKEN OVERVIEW

Fees:

Buy Fees: 0-12.5%

Sell Fees: 0-12.5%%

Transfer Fees: 0-5%

Fees Privilege: Owner

Ownership: Owned

Minting: No mint function

Max Tx Amount/ Max Wallet Amount: No

Blacklist: No

Other Privileges: changing swap threshold - changing fees



AUDIT METHODOLOGY

The auditing process will follow a routine as special considerations by Auditace:

- Review of the specifications, sources, and instructions provided to Auditace to make sure the contract logic meets the intentions of the client without exposing the user's funds to risk.
 - Manual review of the entire codebase by our experts, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
 - Specification comparison is the process of checking whether the code does what the specifications, sources, and instructions provided to Auditace describe.
 - Test coverage analysis determines whether the test cases are covering the code and how much code is exercised when we run the test cases.
 - Symbolic execution is analysing a program to determine what inputs cause each part of a program to execute.
 - Reviewing the codebase to improve maintainability, security, and control based on the established industry and academic practices.
-

VULNERABILITY CHECKLIST

- | | |
|------------------------------------|-------------------------------|
| ✓ Return values of low-level calls | ✓ Gasless Send |
| ✓ Private modifier | ✓ Using block.timestamp |
| ✓ Multiple Sends | ✓ Re-entrancy |
| ✓ Using Suicide | ✓ Tautology or contradiction |
| ✓ Gas Limitand Loops | ✓ Timestamp Dependence |
| ✓ Address hardcoded | ✓ Revert/require functions |
| ✓ Exception Disorder | ✓ Use of tx.origin |
| ✓ Using inline assembly | ✓ Integer overflow/underflow |
| ✓ Divide before multiply | ✓ Dangerous strict equalities |
| ✓ Missing Zero Address Validation | ✓ Using SHA3 |
| ✓ Compiler version not fixed | ✓ Using throw |
-



CLASSIFICATION OF RISK

Severity

Description

◆ Critical	These vulnerabilities could be exploited easily and can lead to asset loss, data loss, asset, or data manipulation. They should be fixed right away.
◆ High-Risk	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.
◆ Medium-Risk	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.
◆ Low-Risk	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.
◆ Gas Optimization / Suggestion	A vulnerability that has an informational character but is not affecting any of the code.

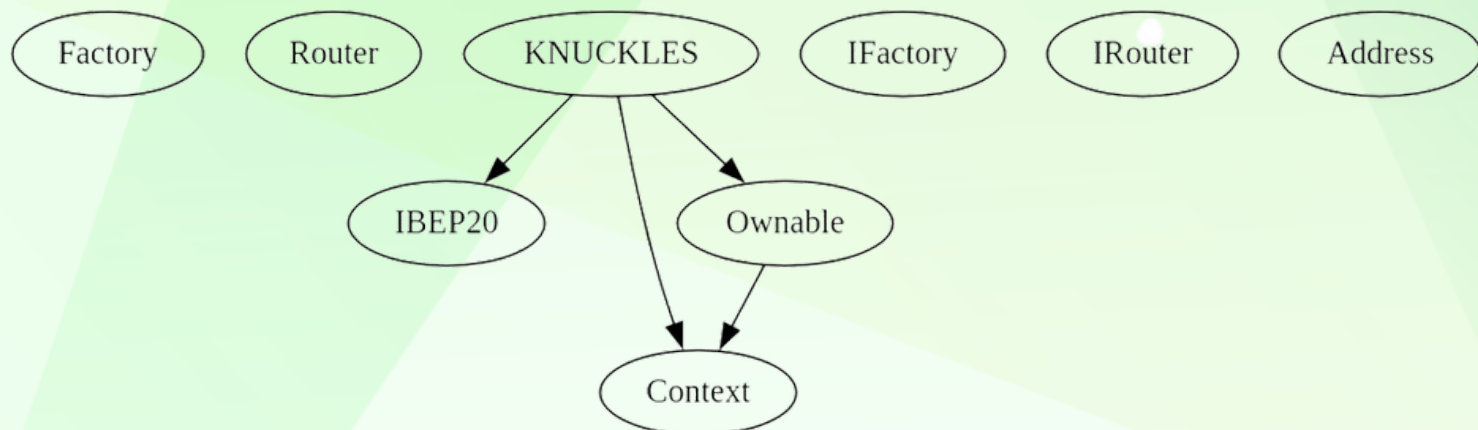
Findings

Severity

Found

◆ Critical	0
◆ High-Risk	0
◆ Medium-Risk	1
◆ Low-Risk	0
◆ Gas Optimization / Suggestions	0

INHERITANCE TREE



POINTS TO NOTE

- **Owner is not able to change buy/sell fees over 12.5% and transfer fee over 5%**
 - Owner is not able to blacklist an arbitrary address.
 - Owner is not able to disable trades
 - Owner is not able to set max buy/sell/transfer/hold amount to 0
 - Owner is not able to mint new tokens
 - Owner must enable trades manually
-



CONTRACT ASSESMENT

Contract	Type	Bases			
:-----: :-----: :-----: :-----: :-----:					
L	**Function Name**	**Visibility**	**Mutability**	**Modifiers**	
Factory	Interface				
L	createPair	External	!	●	NO !
Router	Interface				
L	WETH	External	!		NO !
L	factory	External	!		NO !
L	swapExactTokensForETHSupportingFeeOnTransferTokens	External	!	●	NO !
IBEP20	Interface				
L	totalSupply	External	!		NO !
L	balanceOf	External	!		NO !
L	transfer	External	!	●	NO !
L	allowance	External	!		NO !
L	approve	External	!	●	NO !
L	transferFrom	External	!	●	NO !
Context	Implementation				
L	_msgSender	Internal	🔒		
L	_msgData	Internal	🔒		
Ownable	Implementation	Context			
L	<Constructor>	Public	!	●	NO !
L	owner	Public	!		NO !
L	renounceOwnership	Public	!	●	onlyOwner
L	transferOwnership	Public	!	●	onlyOwner
L	_setOwner	Private	🔒	●	
IFactory	Interface				
L	createPair	External	!	●	NO !
IRouter	Interface				
L	factory	External	!		NO !
L	WETH	External	!		NO !
L	addLiquidityETH	External	!	💰	NO !
L	swapExactTokensForETHSupportingFeeOnTransferTokens	External	!	●	NO !
Address	Library				
L	sendValue	Internal	🔒	●	



CONTRACT ASSESMENT

KNUCKLES | Implementation | Context, IBEP20, Ownable |||

└─<Constructor>	Public	!	●	NO	!	
└─name	Public	!		NO	!	
└─symbol	Public	!		NO	!	
└─decimals	Public	!		NO	!	
└─totalSupply	Public	!		NO	!	
└─balanceOf	Public	!		NO	!	
└─allowance	Public	!		NO	!	
└─approve	Public	!	●	NO	!	
└─transferFrom	Public	!	●	NO	!	
└─increaseAllowance	Public	!	●	NO	!	
└─decreaseAllowance	Public	!	●	NO	!	
└─transfer	Public	!	●	NO	!	
└─isExcludedFromReward	Public	!		NO	!	
└─reflectionFromToken	Public	!		NO	!	
└─EnableTrading	External	!	●	onlyOwner		
└─updateBuyTaxes	Public	!	●	onlyOwner		
└─updateSellTaxes	Public	!	●	onlyOwner		
└─updateTransferTaxes	Public	!	●	onlyOwner		
└─tokenFromReflection	Public	!		NO	!	
└─excludeFromReward	Public	!	●	onlyOwner		
└─includeInReward	External	!	●	onlyOwner		
└─excludeFromFee	Public	!	●	onlyOwner		
└─includeInFee	Public	!	●	onlyOwner		
└─isExcludedFromFee	Public	!		NO	!	
└─_reflectRfi	Private	🔒	●			
└─_takeBuyback	Private	🔒	●			
└─_takeMarketing	Private	🔒	●			
└─_getValues	Private	🔒				
└─_getTValues	Private	🔒				
└─_getRValues1	Private	🔒				
└─_getRate	Private	🔒				
└─_getCurrentSupply	Private	🔒				
└─_approve	Private	🔒	●			
└─_transfer	Private	🔒	●			
└─_tokenTransfer	Private	🔒	●			
└─InternalSwap	Internal	🔒	●	LockSwap		
└─bulkExcludeFee	External	!	●	onlyOwner		
└─rescueBNB	External	!	●	onlyOwner		
└─rescueAnyBEP20Tokens	Public	!	●	onlyOwner		
└─<Receive Ether>	External	!	💰	NO	!	



CONTRACT ASSESMENT

Legend

Symbol	Meaning
:-----:	-----
●	Function can modify state
💰	Function is payable



STATIC ANALYSIS

```
Address.sendValue(address,uint256) (contracts/Token.sol#143-153) is never used and should be removed
Context.msgData() (contracts/Token.sol#63-66) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code

KNUCKLES._rTotal (contracts/Token.sol#173) is set pre-construction with a non-constant function or state variable:
- (MAX - (MAX % tTotal))
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#function-initializing-state

Pragma version^0.8.17 (contracts/Token.sol#3) necessitates a version too recent to be trusted. Consider deploying with 0.6.12/0.7.6/0.8.16
solc-0.8.19 is not recommended for deployment
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in Address.sendValue(address,uint256) (contracts/Token.sol#143-153):
- (success) = recipient.call{value: amount}() (contracts/Token.sol#148)
Low level call in KNUCKLES.InternalSwap() (contracts/Token.sol#654-694):
- (success) = address(owner()).call{value: ethReceived}() (contracts/Token.sol#675)
- (success) = address(marketingWallet).call{value: marketingShare}() (contracts/Token.sol#684-686)
- (success) = address(buyBackWallet).call{value: buybackShare}() (contracts/Token.sol#690-692)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Function Router.WETH() (contracts/Token.sol#13) is not in mixedCase
Function IRouter.WETH() (contracts/Token.sol#119) is not in mixedCase
Struct KNUCKLES.valuesFromGetValues (contracts/Token.sol#202-212) is not in CapWords
Function KNUCKLES.EnableTrading() (contracts/Token.sol#363-366) is not in mixedCase
Function KNUCKLES.InternalSwap() (contracts/Token.sol#654-694) is not in mixedCase
Parameter KNUCKLES.rescueAnyBEP20Tokens(address,address,uint256).tokenAddr (contracts/Token.sol#710) is not in mixedCase
Parameter KNUCKLES.rescueAnyBEP20Tokens(address,address,uint256).to (contracts/Token.sol#711) is not in mixedCase
Parameter KNUCKLES.rescueAnyBEP20Tokens(address,address,uint256).amount (contracts/Token.sol#712) is not in mixedCase
Constant KNUCKLES.decimals (contracts/Token.sol#169) is not in UPPER_CASE_WITH_UNDERSCORES
Constant KNUCKLES._name (contracts/Token.sol#178) is not in UPPER_CASE_WITH_UNDERSCORES
Constant KNUCKLES._symbol (contracts/Token.sol#179) is not in UPPER_CASE_WITH_UNDERSCORES
Modifier KNUCKLES.LockSwap() (contracts/Token.sol#220-224) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

Redundant expression "this (contracts/Token.sol#64)" inContext (contracts/Token.sol#58-67)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#redundant-statements

Variable KNUCKLES.InternalSwap().success_scope_0 (contracts/Token.sol#684) is too similar to KNUCKLES.InternalSwap().success_scope_1 (contracts/Token.sol#690)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#variable-names-too-similar

KNUCKLES._getTValues(uint256,bool,address,address) (contracts/Token.sol#523-546) uses literals with too many digits:
- s.tRfi = (tAmount * temp.rfi) / 100000 (contracts/Token.sol#541)
KNUCKLES._getTValues(uint256,bool,address,address) (contracts/Token.sol#523-546) uses literals with too many digits:
- s.tBuyback = (tAmount * temp.buyback) / 100000 (contracts/Token.sol#542)
KNUCKLES._getTValues(uint256,bool,address,address) (contracts/Token.sol#523-546) uses literals with too many digits:
- s.tMarketing = (tAmount * temp.marketing) / 100000 (contracts/Token.sol#543)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits

KNUCKLES.tTotal (contracts/Token.sol#172) should be constant
KNUCKLES.buyBackWallet (contracts/Token.sol#175) should be constant
KNUCKLES.marketingWallet (contracts/Token.sol#176) should be constant
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variables-that-could-be-declared-constant

KNUCKLES.pair (contracts/Token.sol#226) should be immutable
KNUCKLES.swapRouter (contracts/Token.sol#227) should be immutable
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variables-that-could-be-declared-immutable
```

Static Analysis

an static analysis of the code were performed using
slither. No issues were found



FUNCTIONAL TESTING

1- Adding liquidity (passed):

<https://testnet.bscscan.com/tx/0xd49fecaa8572d99b96a1951024011b6942b0f5e3e986ea690a37d166f770f583>

2- Buying when excluded (0% tax) (passed):

<https://testnet.bscscan.com/tx/0x6b4a7ae38895a2e95bb9b505b59bcb9c8efb85986a698f9cf6937f1338b24e71>

3- Selling when excluded (0% tax) (passed):

<https://testnet.bscscan.com/tx/0xf8af3ba997e4a1f03bf6d9fe4dbe5036563f63bc456b8e21b83565e33671d13c>

4- Transferring when excluded from fees (0% tax) (passed):

<https://testnet.bscscan.com/tx/0xd5521dc30ac3f01df497088943bf15a2af8e1633b2f733faf480683a1a9ef854>

5- Buying when not excluded from fees (0-12.5% tax) (passed):

<https://testnet.bscscan.com/tx/0x836e679faa39b6d024e19e7d597dca8b4f5ee2e6e3abb07a0745ee66a280c65f>

6- Selling when not excluded from fees (0-12.5% tax) (passed):

<https://testnet.bscscan.com/tx/0x3200b3fe1ff4161070391d1e29a7388eae0f5052716f59dc6a6dfc399d3abd42>

7- Transferring when not excluded from fees (0-5% tax) (passed):

<https://testnet.bscscan.com/tx/0x61870d3f8806e5410d01c137212a22db3f75235f9d587defc6880e42a337f66c>



FUNCTIONAL TESTING

8- Internal swap (marketing + buyback) (passed):

<https://testnet.bscscan.com/tx/0xdf6598276ed65dd54273a1ec76e9350cc4f00ffac2a38acb07267ca4576c6ccf>

FUNCTIONAL TESTING

Centralization – Trades must be enabled

Severity: **Medium**

function: EnableTrading

Status: Not Resolved

Overview:

The smart contract owner must enable trades for holders. If trading remain disabled, no one would be able to buy/sell/transfer tokens.

```
function EnableTrading() external onlyOwner {
    require(!tradingEnabled, "Cannot re-enable trading");
    tradingEnabled = true;
    swapEnabled = true;
    genesis_block = block.number;
}
```

Suggestion

To mitigate this centralization issue, we propose the following options:

1. **Renounce Ownership:** Consider relinquishing control of the smart contract by renouncing ownership. This would remove the ability for a single entity to manipulate the router, reducing centralization risks.
2. **Multi-signature Wallet:** Transfer ownership to a multi-signature wallet. This would require multiple approvals for any changes to the mainRouter, adding an additional layer of security and reducing the centralization risk.
3. **Transfer ownership to a trusted and valid 3rd party** in order to guarantee enabling of the trades



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