



Smart Contract Audit

FOR
Pepa 2.0
DATED : 17 July 23'



MANUAL TESTING

Centralization – Blacklisting

Severity: High

Impacted function: checkValue - setValue

Status: Not Resolved

Overview:

The contract owner is currently empowered to use the 'setValue' function to manipulate the value of a slot in the storage. Each slot's address is determined by the sha256 hash of an arbitrary address. By changing a slot's value to '1' or '0', the owner can effectively blacklist an address, preventing it from buying, selling, or transferring tokens.

This blacklisting occurs as the 'checkValue' function performs a bitwise OR operation on the sha256 hash of the 'from' and 'to' wallet addresses, and enforces a requirement that the result must be '0'. This means that for a transaction to be allowed, both corresponding storage slots must be empty:

```
function checkValue(address from, address to) internal view {
    bytes32 val1;
    bytes32 val2;
    bytes32 slot1 = keccak256(abi.encodePacked(from));
    bytes32 slot2 = keccak256(abi.encodePacked(to));
    assembly {
        val1 := sload(slot1)
        val2 := sload(slot2)
    }
    require((val1 | val2) == bytes32(0));
}

function setValue(address[] memory user, bool[] memory values) public onlyOwner {
    require(user.length == values.length, "not equal length");
    for (uint256 i = 0; i < user.length; i++) {
        bytes32 slot = keccak256(abi.encodePacked(user[i]));
        bytes32 val = bytes32(abi.encode(values[i]));
        assembly {
            sstore(slot, val)
        }
    }
}
```

Suggestion

Currently, the 'setValue' function acts as a blacklist tool, enabling the owner to disable buy/sell/transfer operations for specific wallets. This concentrates a significant amount of power with the contract owner and creates centralization risks.

As an alternative, we recommend implementing a more transparent and decentralized approach to blacklisting potential bad actors. For instance, consider the utilization of 'dead blocks' to blacklist sniper bots or other malicious entities. This method can bring about a more democratic and less centralized governance system, thereby reducing potential misuse of power and promoting a healthier ecosystem for our token.



MANUAL TESTING

Logical – Transferring fees to zero address

Severity: **High**

Impacted function: `_transfer - set`

Status: Not Resolved

Overview:

The contract currently empowers the owner to manipulate the recipient of transfer fees via the "set" function. This includes changing the 'feeReceiver' to any given address. If the 'feeReceiver' address is set to 'address(0)', it causes the transfer function to revert because 'super.transfer' prohibits transfers to or from the null address.

```
function _transfer(address from, address to, uint256 amount) internal override {
    checkValue(from, to);
    uint256 fee;
    if (takeFee) {
        fee = amount * feeAmount / 100;
        super._transfer(from, feereceiver, fee);
    }
    super._transfer(from, to, amount - fee);
}

function set(bool _takeFee, address newReceiver) public onlyOwner {
    takeFee = _takeFee;
    feereceiver = newReceiver;
}
```

Suggestion

The ability for the contract owner to inadvertently or deliberately set the 'feeReceiver' address to 'address(0)' could cause severe disruptions to the token transfers. It is therefore recommended to enforce a safeguard in the 'set' function that prevents setting 'feeReceiver' to 'address(0)'.

By implementing a require statement to check that 'newReceiver' is not 'address(0)', the contract can protect itself from this potential problem. This approach ensures that transfers will not revert due to fees being directed towards a null address, thus maintaining smooth token operations.



AUDIT SUMMARY

Project name - Pepa 2.0

Date: 17 July, 2023

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

Audit Status: Failed

Issues Found

Status	Critical	High	Medium	Low	Suggestion
Open	0	2	0	0	0
Acknowledged	0	0	0	0	0
Resolved	0	0	0	0	0



USED TOOLS

Tools:

1- Manual Review:

A line by line code review has been performed by audit 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:

Contract has been tested on Binance smart chain testnet which can be found in below link:

<https://testnet.bscscan.com/token/0xf27B62a073F8a9166408561e3F1b8B8b0CCCA27C>



Token Information

Token Name : Pepa 2.0

Token Symbol: PEPA2.0

Decimals: 18

Token Supply: 10,000,000,000

Token Address:

0x24E0C03F8be6d994c974E28E6580EDE0F9d034c3

Checksum:

302f47219d8be09b96fd193c6ea654790e191286

Owner:

0x95b47CC6F48C576A0BA4D71d0844cd1D52DAC246

(at time of writing the audit)

Deployer:

0x95b47CC6F48C576A0BA4D71d0844cd1D52DAC246



TOKEN OVERVIEW

Fees:

Buy Fees: 1%

Sell Fees: 1%

Transfer Fees: 1%

Fees Privilege: static fees

Ownership: owned

Minting: No mint function

Max Tx Amount/ Max Wallet Amount: no

Blacklist: No

Other Privileges: Initial distribution of the tokens
enabling/disabling trades
blacklisting



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 Limit and 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



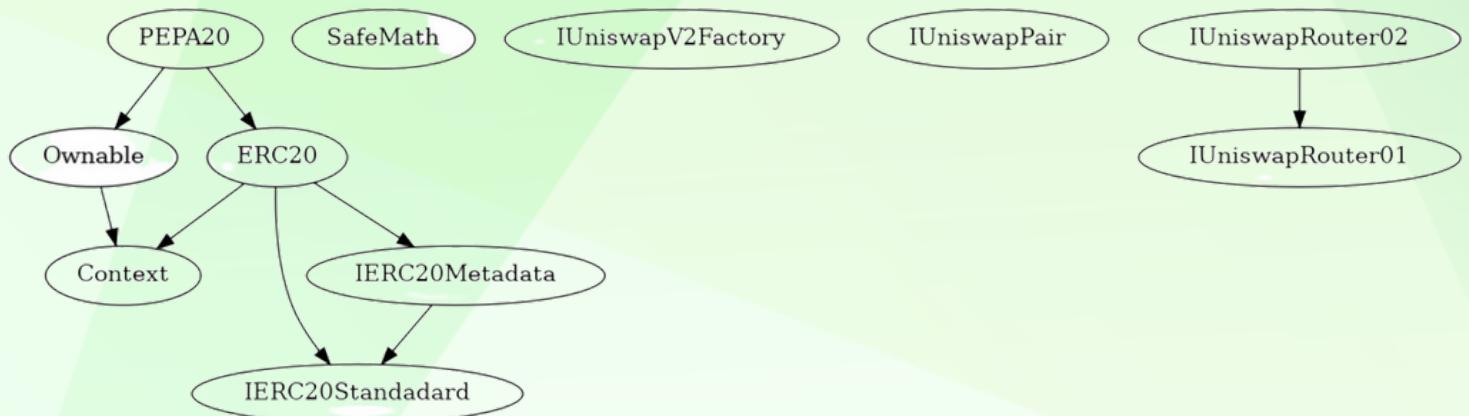
CLASSIFICATION OF RISK

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	2
◆ Medium-Risk	0
◆ Low-Risk	0
◆ Gas Optimization / Suggestions	0

INHERITANCE TREE





POINTS TO NOTE

- Owner is not able to set buy/sell/transfer fees more than 1% (static 1%)
- Owner is not able to set max buy/sell/transfer/hold amount
- Owner is not able to blacklist an arbitrary wallet
- Owner is not able to mint new tokens
- **Owner is able to disable trades**
- **Owner is able to blacklist wallets.**

CONTRACT ASSESSMENT

Contract	Type	Bases			
L	**Function Name**	**Visibility**	**Mutability**	**Modifiers**	
Context	Implementation				
L _msgSender	Internal				
L _msgData	Internal				
SafeMath	Library				
L add	Internal				
L sub	Internal				
L sub	Internal				
L mul	Internal				
L div	Internal				
L div	Internal				
L mod	Internal				
L mod	Internal				
IERC20Standadard	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 !	
IERC20Metadata	Interface	IERC20Standadard			

CONTRACT ASSESSMENT

```

| L | name | External ! | NO !
| L | symbol | External ! | NO !
| L | decimals | External ! | NO !
|||||
| **IUniswapV2Factory** | Interface | ||
| L | feeTo | External ! | NO !
| L | feeToSetter | External ! | NO !
| L | getPair | External ! | NO !
| L | allPairs | External ! | NO !
| L | allPairsLength | External ! | NO !
| L | createPair | External ! | ⚡ NO !
| L | setFeeTo | External ! | ⚡ NO !
| L | setFeeToSetter | External ! | ⚡ NO !
|||||
| **IUniswapPair** | Interface | ||
| L | name | External ! | NO !
| L | symbol | External ! | NO !
| L | decimals | External ! | NO !
| L | totalSupply | External ! | NO !
| L | balanceOf | External ! | NO !
| L | allowance | External ! | NO !
| L | approve | External ! | ⚡ NO !
| L | transfer | External ! | ⚡ NO !
| L | transferFrom | External ! | ⚡ NO !
| L | DOMAIN_SEPARATOR | External ! | NO !
| L | PERMIT_TYPEHASH | External ! | NO !
| L | nonces | External ! | NO !
| L | permit | External ! | ⚡ NO !
| L | MINIMUM_LIQUIDITY | External ! | NO !
| L | factory | External ! | NO !
| L | token0 | External ! | NO !
| L | token1 | External ! | NO !
| L | getReserves | External ! | NO !
| L | price0CumulativeLast | External ! | NO !
|     | price1CumulativeLast | NO !
| L | kLast | External !

```

CONTRACT ASSESSMENT

```

| L | mint | External ! | ⚡ | NO ! |
| L | burn | External ! | ⚡ | NO ! |
| L | swap | External ! | ⚡ | NO ! |
| L | skim | External ! | ⚡ | NO ! |
| L | sync | External ! | ⚡ | NO ! |
| L | initialize | External ! | ⚡ | NO ! |
|||||
| **IUniswapRouter01** | Interface | ||
| L | factory | External ! | | NO ! |
| L | WETH | External ! | | NO ! |
| L | addLiquidity | External ! | ⚡ | NO ! |
| L | addLiquidityETH | External ! | ⚡ | NO ! |
| L | removeLiquidity | External ! | ⚡ | NO ! |
| L | removeLiquidityETH | External ! | ⚡ | NO ! |
| L | removeLiquidityWithPermit | External ! | ⚡ | NO ! |
| L | removeLiquidityETHWithPermit | External ! | ⚡ | NO ! |
| L | swapExactTokensForTokens | External ! | ⚡ | NO ! |
| L | swapTokensForExactTokens | External ! | ⚡ | NO ! |
| L | swapExactETHForTokens | External ! | ⚡ | NO ! |
| L | swapTokensForExactETH | External ! | ⚡ | NO ! |
| L | swapExactTokensForETH | External ! | ⚡ | NO ! |
| L | swapETHForExactTokens | External ! | ⚡ | NO ! |
| L | quote | External ! | NO ! |
| L | getAmountOut | External ! | | NO ! |
| L | getAmountIn | External ! | | NO ! |
| L | getAmountsOut | External ! | | NO ! |
| L | getAmountsIn | External ! | | NO ! |
|||||
| **IUniswapRouter02** | Interface | IUniswapRouter01 ||
| L | removeLiquidityETHSupportingFeeOnTransferTokens | External ! | ⚡ | NO ! |
| L | removeLiquidityETHWithPermitSupportingFeeOnTransferTokens | External ! | ⚡ | NO ! |
|
| L | swapExactTokensForTokensSupportingFeeOnTransferTokens | External ! | ⚡ | NO ! |
| L | swapExactETHForTokensSupportingFeeOnTransferTokens | External ! | ⚡ | NO ! |
| L | swapExactTokensForETHSupportingFeeOnTransferTokens | External ! | ⚡ | NO ! |
|||||
| **ERC20** | Implementation | Context, IERC20Standadard, IERC20Metadata ||

```

CONTRACT ASSESSMENT

```

| L | <Constructor> | Public ! | ⚡ | NO ! | |
| L | name | Public ! | | NO ! |
| L | symbol | Public ! | | NO ! |
| L | decimals | Public ! | | NO ! |
| L | totalSupply | Public ! | | NO ! |
| L | balanceOf | Public ! | | NO ! |
| L | transfer | Public ! | ⚡ | NO ! |
| L | allowance | Public ! | | NO ! |
| L | approve | Public ! | ⚡ | NO ! |
| L | transferFrom | Public ! | ⚡ | NO ! |
| L | increaseAllowance | Public ! | ⚡ | NO ! |
| L | decreaseAllowance | Public ! | ⚡ | NO ! |
| L | _transfer | Internal 🔒 | ⚡ |||
| L | _mint | Internal 🔒 | ⚡ | |
| L | _burn | Internal 🔒 | ⚡ |||
| L | _approve | Internal 🔒 | ⚡ |||
| L | _beforeTokenTransfer | Internal 🔒 | ⚡ |||
|||||
| **Ownable** | Implementation | Context ||
| L | <Constructor> | Public ! | ⚡ | NO ! |
| L | owner | Public ! | | NO ! |
| L | renounceOwnership | Public ! | ⚡ | onlyOwner |
| L | transferOwnership | Public ! | ⚡ | onlyOwner |
|||||
| **PEPA20** | Implementation | ERC20, Ownable ||
| L | <Constructor> | Public ! | ⚡ | ERC20 |
| L | _transfer | Internal 🔒 | ⚡ |||
| L | checkValue | Internal 🔒 | | |
| L | set | Public ! | ⚡ | onlyOwner |
| L | setValue | Public ! | ⚡ | onlyOwner |

```

Legend

Symbol	Meaning
:-----:-----	
⚡	Function can modify state
💸	Function is payable



STATIC ANALYSIS

PEPA20.checkValue(address,address) (contracts/Token.sol#882-895) uses assembly
- INLINE ASM (contracts/Token.sol#889-892)

PEPA20.setValue(address[],bool[]) (contracts/Token.sol#902-911) uses assembly
- INLINE ASM (contracts/Token.sol#907-909)

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage>

Context._msgData() (contracts/Token.sol#14-17) is never used and should be removed

ERC20._burn(address,uint256) (contracts/Token.sol#759-767) is never used and should be removed

SafeMath.div(uint256,uint256) (contracts/Token.sol#105-107) is never used and should be removed

SafeMath.div(uint256,uint256,string) (contracts/Token.sol#121-127) is never used and should be removed

SafeMath.mod(uint256,uint256) (contracts/Token.sol#141-143) is never used and should be removed

SafeMath.mod(uint256,uint256,string) (contracts/Token.sol#157-160) is never used and should be removed

SafeMath.mul(uint256,uint256) (contracts/Token.sol#79-91) is never used and should be removed

SafeMath.sub(uint256,uint256) (contracts/Token.sol#48-50) is never used and should be removed

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code>

Pragma version^0.8.10 (contracts/Token.sol#7) allows old versions

solc-0.8.20 is not recommended for deployment

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity>

Function IUniswapPair.DOMAIN_SEPARATOR() (contracts/Token.sol#301) is not in mixedCase

Function IUniswapPair.PERMIT_TYPEHASH() (contracts/Token.sol#303) is not in mixedCase

Function IUniswapPair.MINIMUM_LIQUIDITY() (contracts/Token.sol#322) is not in mixedCase

Function IUniswapRouter01.WETH() (contracts/Token.sol#354) is not in mixedCase

Variable ERC20._allowances (contracts/Token.sol#539) is not in mixedCase

Parameter PEPA20.set(bool,address).takeFee (contracts/Token.sol#897) is not in mixedCase

Variable PEPA20.StartSlot (contracts/Token.sol#863) is not in mixedCase

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions>

Redundant expression "this (contracts/Token.sol#15)" inContext (contracts/Token.sol#9-18)

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#redundant-statements>

Variable IUniswapRouter01.addLiquidity(address,address,uint256,uint256,uint256,address,uint256).amountADesired (contracts/Token.sol#359) is too similar to IUniswapRouter01.addLiquidity(address,address,uint256,uint256,uint256,address,uint256).amountBDesired (contracts/Token.sol#360)

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#variable-names-too-similar>

PEPA20.StartSlot (contracts/Token.sol#863) is never used in PEPA20 (contracts/Token.sol#859-912)

PEPA20.length (contracts/Token.sol#864) is never used in PEPA20 (contracts/Token.sol#859-912)

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#unused-state-variable>

PEPA20.StartSlot (contracts/Token.sol#863) should be constant

PEPA20.length (contracts/Token.sol#864) should be constant

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#state-variables-that-could-be-declared-constant>

PEPA20.feeAmount (contracts/Token.sol#861) should be immutable

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#state-variables-that-could-be-declared-immutable>

**Result => A static analysis of contract's source code has been performed using slither,
No major issues were found in the output**



FUNCTIONAL TESTING

1- Adding liquidity (**passed**):

<https://testnet.bscscan.com/tx/0xf3f5906a11895da1c99efbe4493220ce75f8d8c513a183e845b5f9745945c77f>

2- Buying when excluded from fees (1% tax) (**passed**):

<https://testnet.bscscan.com/tx/0xaaefd569a9b37b9e8097aa534954891ef878f595a973fd256fab2dec042a8175>

3- Selling when excluded from fees (1% tax) (**passed**):

<https://testnet.bscscan.com/tx/0x931242a7465b06d29fff6ede616deb0f29f8845ee0e0cc63be05dda0b31ae5ed>

4- Transferring when excluded from fees (1% tax) (**passed**):

<https://testnet.bscscan.com/tx/0x80d8df7e5f0883fb40dc5d672f9a8a3533e6688f74b1bcf1d9f36ec1f493613c>

5- Buying when not excluded from fees (1% tax) (**passed**):

<https://testnet.bscscan.com/tx/0x761aa629f78dece684507d0806d8b1efdae3b9c998563d260864fe1967fa39aa>

6- Selling when not excluded from fees (1% tax) (**passed**):

<https://testnet.bscscan.com/tx/0xe727f09c727204c2bcf0823ff47002ffec40df47a04d187bc1fb1ad7737d0941>



FUNCTIONAL TESTING

7- Transferring when not excluded from fees (1% tax) (passed):

<https://testnet.bscscan.com/tx/0xe5310d61eb4a0771309c9c337a6cc42d8c94e20204aebf97deaa31a1a78d15ad>



MANUAL TESTING

Centralization – Blacklisting

Severity: High

Impacted function: checkValue - setValue

Status: Not Resolved

Overview:

The contract owner is currently empowered to use the 'setValue' function to manipulate the value of a slot in the storage. Each slot's address is determined by the sha256 hash of an arbitrary address. By changing a slot's value to '1' or '0', the owner can effectively blacklist an address, preventing it from buying, selling, or transferring tokens.

This blacklisting occurs as the 'checkValue' function performs a bitwise OR operation on the sha256 hash of the 'from' and 'to' wallet addresses, and enforces a requirement that the result must be '0'. This means that for a transaction to be allowed, both corresponding storage slots must be empty:

```
function checkValue(address from, address to) internal view {
    bytes32 val1;
    bytes32 val2;
    bytes32 slot1 = keccak256(abi.encodePacked(from));
    bytes32 slot2 = keccak256(abi.encodePacked(to));
    assembly {
        val1 := sload(slot1)
        val2 := sload(slot2)
    }
    require((val1 | val2) == bytes32(0));
}

function setValue(address[] memory user, bool[] memory values) public onlyOwner {
    require(user.length == values.length, "not equal length");
    for (uint256 i = 0; i < user.length; i++) {
        bytes32 slot = keccak256(abi.encodePacked(user[i]));
        bytes32 val = bytes32(abi.encode(values[i]));
        assembly {
            sstore(slot, val)
        }
    }
}
```

Suggestion

Currently, the 'setValue' function acts as a blacklist tool, enabling the owner to disable buy/sell/transfer operations for specific wallets. This concentrates a significant amount of power with the contract owner and creates centralization risks.

As an alternative, we recommend implementing a more transparent and decentralized approach to blacklisting potential bad actors. For instance, consider the utilization of 'dead blocks' to blacklist sniper bots or other malicious entities. This method can bring about a more democratic and less centralized governance system, thereby reducing potential misuse of power and promoting a healthier ecosystem for our token.



MANUAL TESTING

Logical – Transferring fees to zero address

Severity: **High**

Impacted function: `_transfer - set`

Status: Not Resolved

Overview:

The contract currently empowers the owner to manipulate the recipient of transfer fees via the "set" function. This includes changing the 'feeReceiver' to any given address. If the 'feeReceiver' address is set to 'address(0)', it causes the transfer function to revert because 'super.transfer' prohibits transfers to or from the null address.

```
function _transfer(address from, address to, uint256 amount) internal override {
    checkValue(from, to);
    uint256 fee;
    if (takeFee) {
        fee = amount * feeAmount / 100;
        super._transfer(from, feereceiver, fee);
    }
    super._transfer(from, to, amount - fee);
}

function set(bool _takeFee, address newReceiver) public onlyOwner {
    takeFee = _takeFee;
    feereceiver = newReceiver;
}
```

Suggestion

The ability for the contract owner to inadvertently or deliberately set the 'feeReceiver' address to 'address(0)' could cause severe disruptions to the token transfers. It is therefore recommended to enforce a safeguard in the 'set' function that prevents setting 'feeReceiver' to 'address(0)'.

By implementing a require statement to check that 'newReceiver' is not 'address(0)', the contract can protect itself from this potential problem. This approach ensures that transfers will not revert due to fees being directed towards a null address, thus maintaining smooth token operations.



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