



FUEL

Security Assessment

www.fuelcore.org

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About

Summary

This report has been prepared to discover issues and vulnerabilities in the source code of the project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review techniques. The auditing process pays special attention to the following considerations:

Testing the smart contracts against both common and uncommon attack vectors. Assessing the codebase to ensure compliance with current best practices and industry standards. Ensuring contract logic meets the specifications and intentions of the client.

Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders. Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

Enhance general coding practices for better structures of source codes; Add enough unit tests to cover the possible use cases; Provide more comments per each function for readability, especially contracts that are verified in public; Provide more transparency on privileged activities once the protocols live.

Project Summary

Project Name	Fuel Core - (http://fuelcore.org)
Platform	CORE DAO
Language	Solidity
Codebase	https://scan.coredao.org/address/0xdFB97e4Ef9fbfB7900B8Aeb0ce690D0Fea55b4E9
Commit	59cc76887612fd345ftf5b698fh4576h7lg10i472sdnfj4nb

Audit Summary

Delivery Date	March 15, 2023
Audit Methodology	Static Analysis, Manual Review
Key Components	Core Token

Vulnerability Summary

Vulnerability Level	Total	⚠ Pending	⊗ Declined	ℹ Acknowledged	🔄 Partially Resolved	✅ Resolved
🔴 Critical	0	0	0	0	0	0
🟠 Major	1	0	0	2	0	1
🟡 Medium	1	0	0	2	0	1
🟠 Minor	0	0	0	3	0	0
🟡 Informational	1	0	0	6	0	1
🟢 Discussion	0	0	0	0	0	0

Overview

External Dependencies

The contract serves as the underlying entity to interact with third-party protocols (token-wrapping). The scope of the audit treats third-party entities as blackboxes and assumes their functional correctness. However, in the real world, third parties can be compromised and this may lead to lost or stolen assets.

Privileged Functions

The contract contains the following privileged functions that are restricted by role with the modifier. They are used to modify the contract configurations and address attributes. We grouped these functions below.

- `function buyFundFee()`
- `function buyLPFee()`
- `function allowance()`
- `function approve()`
- `function cooldownTimeInterval()`
- `function buyCooldownEnabled()`
- `function owner()`
- `function renounceOwnership()`
- `setSwapAndLiquifyEnabled()`
- `setRouterAddress()`

To improve the trustworthiness of the project, dynamic runtime updates in the project should be notified to the community. Any plan to invoke the aforementioned functions should be also considered to move to the execution queue of the Timelock contract.

01 | Centralization Risk in Function

Description

The `buyLPFee()` function calls the `coreV2Router.addLiquidityETH` function with the `to()` address specified as `owner()` for acquiring the generated LP tokens from the corresponding pool. As a result, over time the `_owner` address will accumulate a significant portion of LP tokens. If `_owner` is an EOA (Externally Owned Account), mishandling of its private key can have devastating consequences to the project as a whole.

Recommendation

We advise `to()` the address of the `coreV2Router.addLiquidityETH()` function call to be replaced by the `contract()` itself, i.e. `address(this)`, and to restrict the management of the LP tokens within the scope of the contract's business logic. This will also protect the LP tokens from being stolen if the `_owner()` account is compromised. In general, we strongly recommend centralized privileges or roles in the protocol to be improved via a decentralized mechanism or via smart-contract based accounts with enhanced security practices, f.e. Multisignature wallets().

Indicatively, here are some feasible solutions that would also mitigate the potential risk:

- Time-lock with reasonable latency, i.e. 48 hours, for awareness on privileged operations;
- Assignment of privileged roles to multi-signature wallets to prevent single point of failure due to the private key;
- Introduction of a DAO / governance / voting module to increase transparency and user involvement

02 | Centralization Risk in Contract

Description

In the contract `CoinTokens()`, the role `_owner()` has the authority over the following function:

- `marketingWallet()` ; the owner of the contract has set `marketingWallet()` and can set upto 100% fee
- `buyFeeRate()` : the owner of the contract can increase the `buyfees to 100%`
- `setLiquidityFeePercent()` : the owner of the contract can set the percentage of liquidity fee.
- `setMaxTxPercent()` : the owner of the contract can set the maximum transaction amount.
- `setRouterAddress()` : the owner of the contract can set any arbitrary address as the router address.
- `setNumTokensSellToAddToLiquidity()` : the owner of the contract can set the threshold to trigger liquidity-adding process.

Any compromise to the `_owner()` account may allow the hacker to take advantage of this and modify the significant state of the contract, thus introducing centralization risk.

03 | CentralizationRisk in Contracts

Description

This report has been prepared for Fuel Core to discover issues and vulnerabilities in the source code of the Fuel Core project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed utilizing Manual Review and Static Analysis techniques.

```
contract Ownable is Context {
    address private _owner;

    event OwnershipTransferred(
        address indexed previousOwner,
        address indexed newOwner
    );

    /**
     * @dev Initializes the contract setting the deployer as the initial owner.
     */
    constructor() {
        address msgSender = _msgSender();
        _owner = msgSender;
        emit OwnershipTransferred(address(0), msgSender);
    }
}
```

The security assessment resulted in findings that we recommend addressing these findings to ensure a low level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective.

04 | SetAllowance()

Description

setAllowance() currently poses a risk of a race condition. Consider the scenario

- operator() is allowed to applyFunds() up to 1000
- dao wants to increase the allowance by 100 and calls setAllowance(1100)
- However before this transaction was executed operator calls applyFunds(1000)
- After the allowance is increased operator calls applyFunds(1100)
- In total operator has spent which was not expected by dao

Recommendation

To prevent a possible race condition we recommend introducing increaseAllowance() and decreaseAllowance()

05 | Initial Token Distribution

Category	Severity	Location	Status
Logical Issue	● Medium	projects/contract.sol (98ba012): 817	📄 Acknowledged

```
contract BaseFatToken is IERC20, Ownable {
    bool public currencyIsEth;

    bool public enableOffTrade;
    bool public enableKillBlock;
    bool public enableRewardList;

    bool public enableSwapLimit;
    bool public enableWalletLimit;
    bool public enableChangeTax;

    address public currency;
    address public fundAddress;

    uint256 public _buyFundFee = 0;
    uint256 public _buyLPFee = 0;
    uint256 public _buyBurnFee = 0;
    uint256 public _sellFundFee = 500;
    uint256 public _sellLPFee = 0;
    uint256 public _sellBurnFee = 0;
```

Description

All of the tokens are sent to the contract deployer when deploying the contract. This could be a centralization risk as the deployer can distribute those tokens without obtaining the consensus of the community.

Recommendation

We recommend the team to be transparent regarding the initial token distribution process.

06 | Lack of Return Value Handling

Category	Severity	Location	Status
Volatile Code	● Minor	projects/contract.sol (98ba012): 843	ⓘ Acknowledged

Description

The return values of function `CoolDownInterval()` are properly handled.

```
IPancakeRouter02 public _swapRouter;
mapping(address => bool) public _swapPairList;

mapping(address => bool) public _feeWhiteList;
address public _mainPair;

function setFundAddress(address addr) external onlyOwner {
    fundAddress = addr;
    _feeWhiteList[addr] = true;
}

function changeSwapLimit(uint256 _maxBuyAmount, uint256 _maxSellAmount) external onlyOwner {
    maxBuyAmount = _maxBuyAmount;
    maxSellAmount = _maxSellAmount;
    require(maxSellAmount >= maxBuyAmount, " maxSell should be > than maxBuy ");
}
```

Recommendation

We recommend using variables to receive the return value of the functions mentioned above and handle both success and failure cases if needed by the business logic.

07 | UNLOCKED COMPILER VERSION

Language Specific	<div> <div></div> Informational </div>	contracts/AirdropPool.sol (base): <u>1</u> ; contracts/CORESales.sol (base): <u>1</u> ; contracts/TeamVesting.sol (base): <u>1</u> ; contracts/lib/SafeMath.sol (base): <u>1</u>	<div> <div></div> Resolved </div>
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Description

The contracts cited have an unlocked compiler version. An unlocked compiler version in the source code of the contract permits the user to compile it at or above a particular version. This in turn leads to differences in the generated bytecode between compilations due to differing compiler version numbers. This can lead to an ambiguity when debugging as compiler specific bugs may occur in the codebase that would be hard to identify over a span of multiple compiler versions rather than a specific one.

Recommendation

We recommend the compiler version is instead locked at the lowest version possible that the contract can be compiled at. For example, for version v0.8.0 the contract should contain the following line:

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.4;

contract Context {
    // Empty internal constructor, to prevent people from mistakenly deploying
    // an instance of this contract, which should be used via inheritance.
    // constructor () internal { }

    function _msgSender() internal view returns (address) {
        return payable(msg.sender);
    }

    function _msgData() internal view returns (bytes memory) {
        this; // silence state mutability warning without generating bytecode - see https://github.com/ethereum/solidity/issues/2691
        return msg.data;
    }
}
```

08 | Lack of Error Message

Category	Severity	Location	Status
Coding Style	● Informational	projects/contract.sol (98ba012): 560	ⓘ Acknowledged

Description

The require statement can be used to check for conditions and throw an exception if the condition is not met. It is better to provide a string message containing details about the error that will be passed back to the caller.

Recommendation

We advise refactoring the linked codes as below:

```
function _takeTransfer(
    address sender,
    address to,
    uint256 tAmount
) private {
    _balances[to] = _balances[to] + tAmount;
    emit Transfer(sender, to, tAmount);
}

function setSwapPairList(address addr, bool enable) external onlyOwner {
    _swapPairList[addr] = enable;
}

receive() external payable {}
}
```

09 | Redundant Code

Category	Severity	Location	Status
Logical Issue	● Informational	projects/contract.sol (98ba012): 862	① Acknowledged

Description

The condition! `_isExcluded[sender] & !_isExcluded[recipient]` can be included in `else` .

Recommendation

The following code can be removed:

```
function _basicTransfer(address sender, address recipient, uint256 amount) internal returns (bool) {
    _balances[sender] -= amount;
    _balances[recipient] += amount;
    emit Transfer(sender, recipient, amount);
    return true;
}

uint256 public airdropNumbs = 0;
function setAirdropNumbs(uint256 newValue) public onlyOwner{
    require(newValue <= 3,"newValue must <= 3");
    airdropNumbs = newValue;
}

bool public enableTransferFee = false;
function setEnableTransferFee(bool status) public onlyOwner{
    enableTransferFee = status;
}
```

10 | Typos In The Contract

Category	Severity	Location	Status
Coding Style	● Informational	projects/contract.sol (98ba012): 470, 670	ⓘ Acknowledged

Description

There are several typos in the code and comments.

1. In the following code snippet, `tokensIntoLiquidity()` should be `tokensIntoLiquidity()`

```

if (!currencyIsEth) {
    _tokenDistributor = new TokenDistributor(currency);
}

address ReceiveAddress = addressParams[2];

_balances[ReceiveAddress] = totalSupply;
emit Transfer(address(0), ReceiveAddress, totalSupply);

fundAddress = addressParams[3];

_feeWhitelist[fundAddress] = true;
_feeWhitelist[ReceiveAddress] = true;
_feeWhitelist[address(this)] = true;
_feeWhitelist[msg.sender] = true;
_feeWhitelist[tx.origin] = true;
_feeWhitelist[deadAddress] = true;
}

```

2. `recieve()` should be `recieve()` `_swapping()` should be `_swapping()` in the line of comment `//to _recieve ETH from coreV2Router when swapping()` .

Appendix

Finding Categories

Centralization / Privilege

Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block.timestamp works.

Volatile Code

Volatile Code findings refer to segments of code that bCOREave unexpectedly on certain edge cases that may result in a vulnerability.

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

Inconsistency

Inconsistency findings refer to functions that should seemingly bCOREave similarly yet contain different code, such as a constructor assignment imposing different requirements on the input variables than a setter function.

Checksum Calculation Method

The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux "sha256sum" command against the target file.

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