



SOLIDProof
Bring trust into your projects

Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

Audit

Security Assessment
2. August, 2021

For



Disclaimer	3
Description	5
Project Engagement	5
Logo	5
Contract Link	5
Methodology	7
Used Code from other Frameworks/Smart Contracts (direct imports)	8
Tested Contract Files	9
Source Lines	10
Risk Level	10
Capabilities	11
Scope of Work	13
Inheritance Graph	13
Verify Claims	14
CallGraph	19
Source Units in Scope	20
Critical issues	21
High issues	21
Medium issues	21
Low issues	21
Informational issues	21
Audit Comments	22
SWC Attacks	23

Disclaimer

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Version	Date	Description
1.0	02. August 2021	<ul style="list-style-type: none">• Layout project• Automated- /Manual-Security Testing• Summary

Network

Binance Smart Chain (BEP20)

Website

buffaloswap.org

Telegram

<https://t.me/buffaloswapnews>

<https://t.me/buffaloswap>

Twitter

<https://twitter.com/BuffaloswapDex>

Github

<https://t.me/buffaloswap>



Description

Buffaloswap aims to provide a fair, sustainable and safe yield farm optimizer for everyone.

Project Engagement

During the 31st of July 2021, **Buffalo Token Team** engaged Solidproof.io to audit smart contracts that they created. The engagement was technical in nature and focused on identifying security flaws in the design and implementation of the contracts. **Buffalo Token Team** provided Solidproof.io with access to their code repository and whitepaper.

Logo



Contract Link

<https://bscscan.com/address/0x10a49f1fC8C604eA7f1c49bcc6ab2A8E58e77EA5#code>

Vulnerability & Risk Level

Risk represents the probability that a certain source-threat will exploit vulnerability, and the impact of that event on the organization or system. Risk Level is computed based on CVSS version 3.0.

Level	Value	Vulnerability	Risk (Required Action)
Critical	9 - 10	A vulnerability that can disrupt the contract functioning in a number of scenarios, or creates a risk that the contract may be broken.	Immediate action to reduce risk level.
High	7 – 8.9	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.	Implementation of corrective actions as soon as possible.
Medium	4 – 6.9	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.	Implementation of corrective actions in a certain period.
Low	2 – 3.9	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.	Implementation of certain corrective actions or accepting the risk.
Informational	0 – 1.9	A vulnerability that have informational character but is not effecting any of the code.	An observation that does not determine a level of risk

Auditing Strategy and Techniques Applied

Throughout the review process, care was taken to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. To do so, reviewed line-by-line by our team of expert pentesters and smart contract developers, documenting any issues as there were discovered.

Methodology

The auditing process follows a routine series of steps:

1. Code review that includes the following:
 - i) Review of the specifications, sources, and instructions provided to SolidProof to make sure we understand the size, scope, and functionality of the smart contract.
 - ii) Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
 - iii) Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to SolidProof describe.
2. Testing and automated analysis that includes the following:
 - i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
 - ii) Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.
3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.
4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts.

Used Code from other Frameworks/Smart Contracts (direct imports)

Imported packages:

- OpenZeppelin
 - Address
 - Ownable
 - SafeMatch
- Uniswap
 - UniswapV2Factory
 - UniswapV2Pair
 - UniswapV2Router01
 - UniswapV2Router02



Tested Contract Files

This audit covered the following files listed below with a SHA-1 Hash.

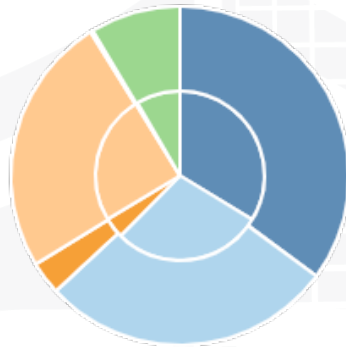
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

File Name	SHA-1 Hash
contracts/bufalotoken.sol	4a915a49b9ce04bf9567c1500626057a3ebcd570

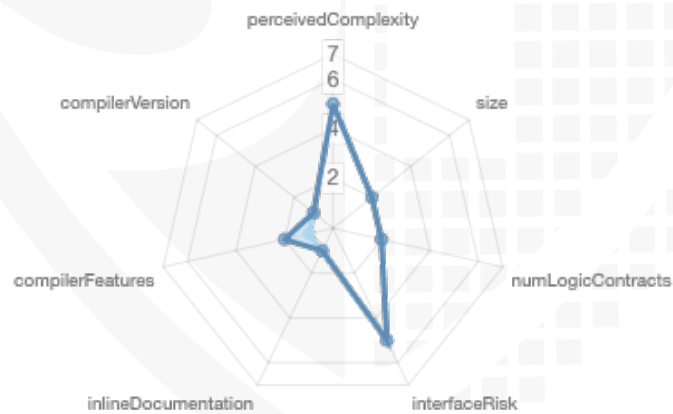


Metrics

Source Lines



Risk Level



Capabilities

Components

Contracts	Libraries	Interfaces	Abstract
2	2	6	2

Exposed Functions

This section lists functions that are explicitly declared public or payable. Please note that getter methods for public stateVars are not included.

Public	Payable
120	5

External	Internal	Private	Pure	View
89	112	4	31	50

State Variables

Total	Public
28	15

Capabilities

Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
<code>>=0.6.0</code> <code><0.8.0</code> <code>>=0.6.2</code> <code><0.8.0</code> <code>>=0.4.0</code> <code>>=0.5.0</code> <code>>=0.6.2</code> <code>0.6.12</code>		yes	yes (3 asm blocks)	

Transfers ETH	Low- Level Calls	Delegate Call	Uses Hash Function s	ECRecover	New/ Create/ Create2
		yes	yes	yes	



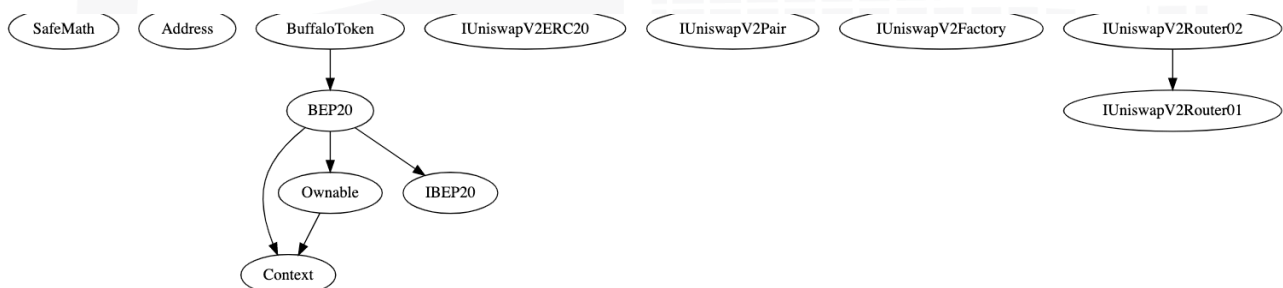
Scope of Work

The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Correct implementation of Token standard
2. Deployer cannot mint any new tokens
3. Deployer cannot burn or lock user funds
4. Deployer cannot pause the contract
5. Overall checkup (Smart Contract Security)

Inheritance Graph



Verify Claims

Correct implementation of Token standard

Tested	Verified
✓	✓

Function	Description	Exist	Tested	Verified
TotalSupply	provides information about the total token supply	✓	✓	✓
BalanceOf	provides account balance of the owner's account	✓	✓	✓
Transfer	executes transfers of a specified number of tokens to a specified address	✓	✓	✓
TransferFrom	executes transfers of a specified number of tokens from a specified address	✓	✓	✓
Approve	allow a spender to withdraw a set number of tokens from a specified account	✓	✓	✓
Allowance	returns a set number of tokens from a spender to the owner	✓	✓	✓

Optional implementations

Function	Description	Exist	Tested	Verified
renounceOwnership	Owner renounce ownership for more trust	✓	✓	✓

Deployer cannot mint any new tokens

Tested	Deployer cannot mint	File	Comment
✓	✗	Main	-

Max / Total Supply: 20,000,000 (Added by minting, TX Hash: 0xfb02899a7aed76e2e19fe50598bd900418e7aa001ce17a25d8c216193ea4b55a)

```
/// @notice Creates `_amount` token to `_to`. Must only be called by the owner (MasterChef).  
function mint(address _to, uint256 _amount) public onlyOwner {  
    _mint(_to, _amount);  
    _moveDelegates(address(0), _delegates[_to], _amount);  
}
```

```
function mint(uint256 amount) public onlyOwner returns (bool) {  
    _mint(_msgSender(), amount);  
    return true;  
}
```

Deployer cannot burn or lock user funds

Name	Tested	Exist	Verified
Deployer cannot lock	✓	✓	✓
Deployer cannot burn	✓	✓	✗

- There is no burn function, but every transfer where the recipient is equal to Burnaddress will be automatically burned because the transfer is going to the burn address
- There is always a burn when a transfer is called (burnAmount = taxAmount.mul(burnRate).div(100))

```

/// @dev overrides transfer function to meet tokenomics of BUFFALO
function _transfer(address sender, address recipient, uint256 amount) internal virtual override antiWhale(sender, recipient, amount) {
    // swap and liquify
    if (
        swapAndLiquifyEnabled == true
        && _inSwapAndLiquify == false
        && address(buffaloSwapRouter) != address(0)
        && buffaloSwapPair != address(0)
        && sender != buffaloSwapPair
        && sender != owner()
    ) {
        swapAndLiquify();
    }

    if (recipient == BURN_ADDRESS || transferTaxRate == 0) {
        super._transfer(sender, recipient, amount);
    } else {
        // default tax is 2.99% of every transfer
        uint256 taxAmount = amount.mul(transferTaxRate).div(10000);
        uint256 burnAmount = taxAmount.mul(burnRate).div(100);
        uint256 liquidityAmount = taxAmount.sub(burnAmount);
        require(taxAmount == burnAmount + liquidityAmount, "BUFFALO::transfer: Burn value invalid");

        // default 97.11% of transfer sent to recipient
        uint256 sendAmount = amount.sub(taxAmount);
        require(amount == sendAmount + taxAmount, "BUFFALO::transfer: Tax value invalid");

        super._transfer(sender, BURN_ADDRESS, burnAmount);
        super._transfer(sender, address(this), liquidityAmount);
        super._transfer(sender, recipient, sendAmount);
        amount = sendAmount;
    }
}

```

- Burn rate can be updated by operator

```

function updateBurnRate(uint16 _burnRate) public onlyOperator {
    require(_burnRate <= 100, "BUFFALO::updateBurnRate: Burn rate must not exceed the maximum rate.");
    emit BurnRateUpdated(msg.sender, burnRate, _burnRate);
    burnRate = _burnRate;
}

```


Deployer cannot pause the contract

Tested	Verified	Deployer cannot pause
✓	✓	✓

1. approve



2. decreaseAllowance



3. increaseAllowance



4. transfer



5. transferFrom



Powered by [Etherscan.io](https://etherscan.io). Browse [source code](#)



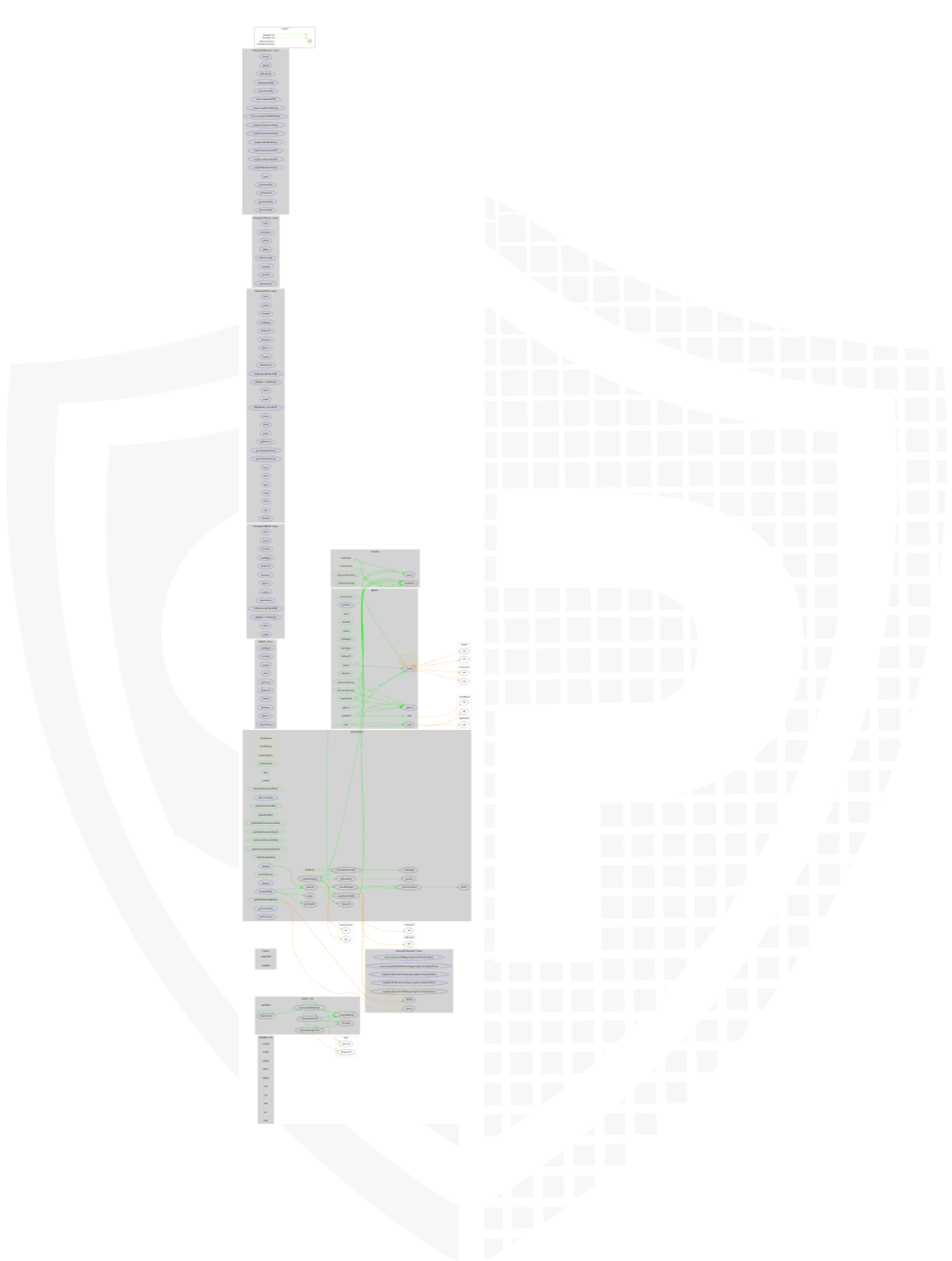
Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓





Legend

Attribute	Symbol
Verified / Checked	✓
Partly Verified	⚠
Unverified / Not checked	✗

CallGraph



Source Units in Scope

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/bufalotoken.sol	6	6	1697	1333	637	665	599	
	Totals	6	6	1697	1333	637	665	599	

Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalized lines of the source unit (e.g. normalizes functions spanning multiple lines)
nSLOC	normalized source lines of code (only source-code lines; no comments, no blank lines)
Comment Lines	lines containing single or block comments
Complexity Score	a custom complexity score derived from code statements that are known to introduce code complexity (branches, loops, calls, external interfaces, ...)

Audit Results

AUDIT PASSED

Critical issues

- no critical issues found -

High issues

- no high issues found -

Medium issues

- no medium issues found -

Low issues

Issue	File	Type	Line	Description
#1	Main	A floating pragma is set	7	The current pragma Solidity directive is "">=0.6.0<0.8.0"".

Informational issues

- no informational issues found -

Audit Comments

02. August 2021:

- There is still an owner (Owner still has not renounced ownership)
- There is no burn function, but every transfer where the recipient is equal to Burnaddress will be automatically burned because the transfer is going to the burn address
- There is always a burn when a transfer is called ($\text{burnAmount} = \text{taxAmount.mul(burnRate).div(100)}$)
-
- Owner can enable/disable swap



SWC Attacks

ID	Title	Relationships	Status
SW C-13 6	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
SW C-13 5	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
SW C-13 4	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
SW C-13 3	Hash Collisions With Multiple Variable Length Arguments	CWE-294: Authentication Bypass by Capture-replay	PASSED
SW C-13 2	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
SW C-13 1	Presence of unused variables	CWE-1164: Irrelevant Code	PASSED
SW C-13 0	Right-To-Left-Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
SW C-12 9	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
SW C-12 8	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SW C-12 7	Arbitrary Jump with Function Type Variable	CWE-695: Use of Low-Level Functionality	PASSED
SW C-12 5	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
SW C-12 4	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
SW C-12 3	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
SW C-12 2	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
SW C-12 1	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
SW C-12 0	Weak Sources of Randomness from Chain Attributes	CWE-330: Use of Insufficiently Random Values	PASSED
SW C-11 9	Shadowing State Variables	CWE-710: Improper Adherence to Coding Standards	PASSED
SW C-11 8	Incorrect Constructor Name	CWE-665: Improper Initialization	PASSED
SW C-11 7	Signature Malleability	CWE-347: Improper Verification of Cryptographic Signature	PASSED

SW C-11 6	Timestamp Dependence	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SW C-11 5	Authorization through tx.origin	CWE-477: Use of Obsolete Function	PASSED
SW C-11 4	Transaction Order Dependence	CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')	PASSED
SW C-11 3	DoS with Failed Call	CWE-703: Improper Check or Handling of Exceptional Conditions	PASSED
SW C-11 2	Delegatecall to Untrusted Callee	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SW C-111	Use of Deprecated Solidity Functions	CWE-477: Use of Obsolete Function	PASSED
SW C-11 0	Assert Violation	CWE-670: Always-Incorrect Control Flow Implementation	PASSED
SW C-10 9	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
SW C-10 8	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED
SW C-10 7	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SW C-10 6	Unprotected SELFDESTRUCT Instruction	CWE-284: Improper Access Control	PASSED

SW C-10 5	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
SW C-10 4	Unchecked Call Return Value	CWE-252: Unchecked Return Value	PASSED
SW C-10 3	Floating Pragma	CWE-664: Improper Control of a Resource Through its Lifetime	NOT PASSED
SW C-10 2	Outdated Compiler Version	CWE-937: Using Components with Known Vulnerabilities	PASSED
SW C-10 1	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
SW C-10 0	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED

The logo features the word "SolidProofed" in a white, handwritten-style script. The "P" is particularly large and stylized, with a long horizontal stroke that extends to the left. The background is a solid blue color with a faint, large shield emblem. The shield has a grid-like pattern on its right side and a solid blue area on its left side.

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A small horizontal bar representing the German flag, with black, red, and gold stripes.

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