



# FLAT EARTH TOKEN SMART CONTRACT CODE REVIEW AND SECURITY ANALYSIS REPORT

**Customer:** FLAT Team (<https://flatearthtoken.com>)  
**Prepared on:** 15/04/2021  
**Platform:** Binance Smart Chain  
**Language:** Solidity  
**Audit Type:** Standard

audit@etherauthority.io

# Table of contents

Project File	4
Introduction	4
Quick Stats	5
Executive Summary	6
Code Quality	6
Documentation	7
Use of Dependencies	7
AS-IS overview	8
Severity Definitions	10
Audit Findings	11
Conclusion	13
Our Methodology	14
Disclaimers	16
<b>Appendix:</b>	
Code Flow Diagram	17
Slither Results Log	18

THIS IS SECURITY AUDIT REPORT DOCUMENT AND WHICH MAY CONTAIN INFORMATION WHICH IS CONFIDENTIAL. WHICH INCLUDES ANY POTENTIAL VULNERABILITIES AND MALICIOUS CODES WHICH CAN BE USED TO EXPLOIT THE SOFTWARE. THIS MUST BE REFERRED INTERNALLY AND ONLY SHOULD BE MADE AVAILABLE TO PUBLIC AFTER ISSUES ARE RESOLVED.

## Project file

<b>Name</b>	Smart Contract Code Review and Security Analysis Report for Flat Earth Token
<b>Platform</b>	Binance Smart Chain / Solidity
<b>File 1</b>	CoinToken.sol
<b>File 1 MD5 hash</b>	BDF1187CAC09A73C9AB9B51255DC72F9
<b>File 1 BscScan Contract URL</b>	<a href="https://bscscan.com/address/0x41540ba32dB90269Bb72A7bE1D4b1eE18F5544f1#code">https://bscscan.com/address/0x41540ba32dB90269Bb72A7bE1D4b1eE18F5544f1#code</a>
<b>Date</b>	15/04/2021

## Introduction

We were contracted by the FLAT team to perform the Security audit of the smart contracts code. The audit has been performed using manual analysis as well as using automated software tools. This report presents all the findings regarding the audit performed on 15/04/2021.

The Audit type was Standard Audit. Which means this audit is concluded based on Standard audit scope, which is one security engineer performing audit procedure for 2 days. This document outlines all the findings as well as AS-IS overview of the smart contract codes.

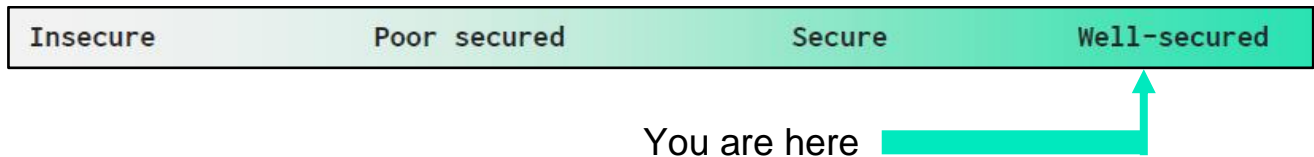
## Quick Stats:

Main Category	Subcategory	Result
Contract Programming	Solidity version not specified	Passed
	Solidity version too old	Moderated
	Integer overflow/underflow	Passed
	Function input parameters lack of check	Passed
	Function input parameters check bypass	Passed
	Function access control lacks management	Passed
	Critical operation lacks event log	Passed
	Human/contract checks bypass	Passed
	Random number generation/use vulnerability	N/A
	Fallback function misuse	Passed
	Race condition	Passed
	Logical vulnerability	Passed
	Other programming issues	Passed
Code Specification	Function visibility not explicitly declared	Passed
	Var. storage location not explicitly declared	Passed
	Use keywords/functions to be deprecated	Passed
	Other code specification issues	Passed
Gas Optimization	Assert() misuse	Passed
	High consumption 'for/while' loop	Passed
	High consumption 'storage' storage	Passed
	"Out of Gas" Attack	Passed
Business Risk	The maximum limit for mintage not set	Not Set
	"Short Address" Attack	Passed
	"Double Spend" Attack	Passed

**Overall Audit Result: PASSED**

## Executive Summary

According to the **standard** audit assessment, Customer's solidity smart contract is **well secured**.



We used various tools like Mythril, Slither and Remix IDE. At the same time this finding is based on critical analysis of the manual audit.

All issues found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the Audit overview section. General overview is presented in AS-IS section and all identified issues can be found in the Audit overview section.

**We found 0 high, 0 medium and 1 low and some very low level issues.**

## Code Quality

FLAT protocol consists of 1 core smart contract file. These smart contracts also contain Libraries and Smart contract inherits. These are compact and well written contracts.

The libraries in the FLAT protocol are part of its logical algorithm. A library is a different type of smart contract that contains reusable code. Once deployed on the blockchain (only once), it is assigned a specific address and its properties / methods can be reused many times by other contracts in the FLAT protocol.

The FLAT team has **not** provided scenario and unit test scripts, which would have helped to determine the integrity of the code in an automated way.

Overall, code parts are **not** well commented. Commenting can provide rich documentation for functions, return variables and more. Ethereum Natural Language Specification Format (NatSpec) is recommended.

## Documentation

We were given FLAT smart contracts code in the form of BscScan web link. The hash of that file and its web link are mentioned above in the table.

As mentioned above, most code parts are **not** well commented. so anyone can not quickly understand the programming flow as well as complex code logic. Comments are very helpful in understanding the overall architecture of the protocol.

Another source of information was its official website which provided rich information about the project architecture and tokenomics.

## Use of Dependencies

As per our observation, the libraries are used in this smart contract infrastructure that are based on well known industry standard open source projects. And their core code blocks are written well.

Apart from libraries, there are no external smart contract calls happening in this FLAT token contract.

# AS-IS overview

FLAT is a BEP20 standard smart contract. It also has other features like burning, minting, etc. The smart contract was deployed in BSC mainnet at the time of the audit. Following are the main components of core smart contracts.

## CoinToken.sol

### (1) Inherited contracts

- (a) PausableToken: Token functions when not paused restrictions
- (b) StandardToken: BEP20 Token functions
- (c) Pausable: Functions for pause and unpaue
- (d) ERC20: BEP20 token functions
- (e) ERC20Basic: BEP20 token functions
- (f) Ownable: Ownership smart contract

### (2) Usages

- (a) using SafeMath for uint256

### (3) Events

- (a) event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
- (b) event Pause();
- (c) event Unpause();
- (d) event Transfer(address indexed from, address indexed to, uint256 value);
- (e) event Approval(address indexed owner, address indexed spender, uint256 value);
- (f) event Blacklist(address indexed blackListed, bool value);
- (g) event Mint(address indexed from, address indexed to, uint256 value);
- (h) event Burn(address indexed burner, uint256 value);



#### (4) Functions

Sl.	Function	Type	Observation	Conclusion
1	constructor	write	Passed	No Issue
2	name	read	Passed	No Issue
3	totalSupply	read	Passed	No Issue
4	decimals	read	Passed	No Issue
5	paused	read	Passed	No Issue
6	balanceOf	read	Passed	No Issue
7	owner	read	Passed	No Issue
8	symbol	read	Passed	No Issue
9	allowance	read	Passed	No Issue
11	approve	write	Passed	No Issue
12	blackListAddress	write	Passed	Ownership will be blackholed. So, No Issue
13	burn	write	Passed	No Issue
14	decreaseAllowance	write	Passed	No Issue
15	increaseAllowance	write	Passed	No Issue
16	mint	write	No Max Minting Set	Ownership will be blackholed. So, this is auto-resolved
17	pause	write	Passed	Ownership will be blackholed. So, No Issue
18	transfer	write	Passed	No Issue
19	transferFrom	write	Passed	No Issue
20	transferOwnership	write	Passed	No Issue
21	unpause	write	Passed	Ownership will be blackholed. So, No Issue

# Severity Definitions

Risk Level	Description
<b>Critical</b>	Critical vulnerabilities are usually straightforward to exploit and can lead to tokens loss etc.
<b>High</b>	High-level vulnerabilities are difficult to exploit; however, they also have significant impact on smart contract execution, e.g. public access to crucial functions
<b>Medium</b>	Medium-level vulnerabilities are important to fix; however, they can't lead to tokens lose
<b>Low</b>	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can't have significant impact on execution
<b>Lowest / Code Style / Best Practice</b>	Lowest-level vulnerabilities, code style violations and info statements can't affect smart contract execution and can be ignored.

## Audit Findings

### Critical

No critical severity vulnerabilities were found.

### High

No high severity vulnerabilities were found.

### Medium

No medium severity vulnerabilities were found.

## Low

### (1) No Max minting of the tokens set

```
function mint(address account, uint256 amount) onlyOwner public {  
    totalSupply = totalSupply.add(amount);  
    balances[account] = balances[account].add(amount);  
    emit Mint(address(0), account, amount);  
    emit Transfer(address(0), account, amount);  
}
```

Setting max minting for the tokens is good for the tokenomics.

Resolution: FLAT team confirmed that they will blackhole the ownership and thus all the owner functions will stop working and thus, this issue will be automatically resolved.

### **Very Low / Discussion / Best practices:**

(1) Use the latest solidity version while contract deployment to prevent any compiler version level bugs.

Resolution: This issue is acknowledged.

(2) Approve of BEP20 standard: This can be used to front run. From the client side, only use this function to change the allowed amount to 0 or from 0 (wait till transaction is mined and approved).

(3) To leverage decentralization, it is recommended to either renounce or blackhole the ownership.

(4) All functions which are not called internally, must be declared as external. It is more efficient as sometimes it saves some gas.

<https://ethereum.stackexchange.com/questions/19380/external-vs-public-best-practices>

## Conclusion

We were given contract code. And we have used all possible tests based on given objects as files. The contracts are written so systematically, that we did not find any major issues. **So it is good to go for the production.**

Since possible test cases can be unlimited for such extensive smart contract protocol, so we provide no such guarantee of future outcomes. We have used all the latest static tools and manual observations to cover maximum possible test cases to scan everything.

Smart contracts within the scope were manually reviewed and analyzed with static analysis tools. Smart Contract's high level description of functionality was presented in As-is overview section of the report.

Audit report contains all found security vulnerabilities and other issues in the reviewed code.

Security state of the reviewed contract, based on extensive audit procedure scope is "**Well Secured**".

# Our Methodology

We like to work with a transparent process and make our reviews a collaborative effort. The goals of our security audits are to improve the quality of systems we review and aim for sufficient remediation to help protect users. The following is the methodology we use in our security audit process.

## **Manual Code Review:**

In manually reviewing all of the code, we look for any potential issues with code logic, error handling, protocol and header parsing, cryptographic errors, and random number generators. We also watch for areas where more defensive programming could reduce the risk of future mistakes and speed up future audits. Although our primary focus is on the in-scope code, we examine dependency code and behavior when it is relevant to a particular line of investigation.

## **Vulnerability Analysis:**

Our audit techniques included manual code analysis, user interface interaction, and whitebox penetration testing. We look at the project's web site to get a high level understanding of what functionality the software under review provides. We then meet with the developers to gain an appreciation of their vision of the software. We install and use the relevant software, exploring the user interactions and roles. While we do this, we brainstorm threat models and attack surfaces. We read design documentation, review other audit results, search for similar projects, examine source code dependencies, skim open issue tickets, and generally investigate details other than the implementation.

## **Documenting Results:**

We follow a conservative, transparent process for analyzing potential security vulnerabilities and seeing them through successful remediation. Whenever a potential issue is discovered, we immediately create an Issue entry for it in this document, even though we have not yet verified the feasibility and impact of the issue. This process is conservative because we document our suspicions early even if they are later shown to not represent exploitable vulnerabilities. We generally follow a process of first documenting the suspicion with unresolved questions, then confirming the issue through code analysis, live experimentation, or automated tests. Code analysis is the most tentative, and we strive to provide test code, log captures, or screenshots demonstrating our confirmation. After this we analyze the feasibility of an attack in a live system.

## **Suggested Solutions:**

We search for immediate mitigations that live deployments can take, and finally we suggest the requirements for remediation engineering for future releases. The mitigation and remediation recommendations should be scrutinized by the developers and deployment engineers, and successful mitigation and remediation is an ongoing collaborative process after we deliver our report, and before the details are made public.

# Disclaimers

## EtherAuthority.io Disclaimer

EtherAuthority team has analyzed this smart contract in accordance with the best industry practices at the date of this report, in relation to: cybersecurity vulnerabilities and issues in smart contract source code, the details of which are disclosed in this report, (Source Code); the Source Code compilation, deployment and functionality (performing the intended functions).

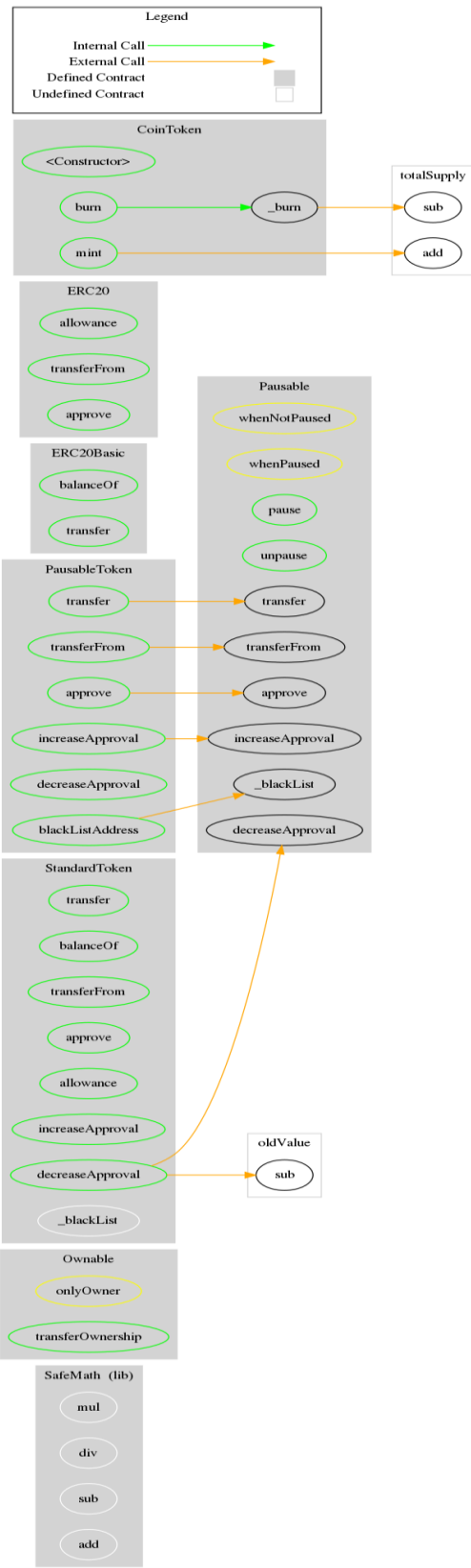
Due to the fact that the total number of test cases are unlimited, so the audit makes no statements or warranties on security of the code. It also cannot be considered as a sufficient assessment regarding the utility and safety of the code, bugfree status or any other statements of the contract. While we have done our best in conducting the analysis and producing this report, it is important to note that you should not rely on this report only. We also suggest to conduct a bug bounty program to confirm the high level of security of this smart contract.

## Technical Disclaimer

Smart contracts are deployed and executed on blockchain platform. The platform, its programming language, and other software related to the smart contract can have their own vulnerabilities that can lead to hacks. Thus, the audit can't guarantee explicit security of the audited smart contracts.

# Appendix

## Code Flow Diagram





## Slither Results

root@fedrik-ThinkPad-T410:/home/fedrik/Downloads# slither  
/home/fedrik/cointokenBNB/CoinToken.sol

INFO:Detectors:

CoinToken.constructor(string,string,uint256,uint256,address).tokenOwner

(../cointokenBNB/CoinToken.sol#238) lacks a zero-check on :

- owner = tokenOwner (../cointokenBNB/CoinToken.sol#244)

Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#missing-zero-addressvalidation>

INFO:Detectors:

StandardToken.transfer(address,uint256) (../cointokenBNB/CoinToken.sol#129-139) compares to a

boolean constant:

-require(bool)(tokenBlacklist[msg.sender] == false) (../cointokenBNB/CoinToken.sol#130)

StandardToken.transferFrom(address,address,uint256) (../cointokenBNB/CoinToken.sol#146-157) compares to a boolean constant:

-require(bool)(tokenBlacklist[msg.sender] == false) (../cointokenBNB/CoinToken.sol#147)

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

INFO:Detectors:

Pragma version^0.4.24 (../cointokenBNB/CoinToken.sol#5) allows old versions

solc-0.4.24 is not recommended for deployment

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

INFO:Detectors:

Parameter StandardToken.transfer(address,uint256).\_to (../cointokenBNB/CoinToken.sol#129) is not in mixedCase

Parameter StandardToken.transfer(address,uint256).\_value (../cointokenBNB/CoinToken.sol#129) is not in mixedCase

Parameter StandardToken.balanceOf(address).\_owner (../cointokenBNB/CoinToken.sol#142) is not

in mixedCase

Parameter StandardToken.transferFrom(address,address,uint256).\_from (../cointokenBNB/CoinToken.sol#146) is not in mixedCase

Parameter StandardToken.transferFrom(address,address,uint256).\_to (../cointokenBNB/CoinToken.sol#146) is not in mixedCase

Parameter StandardToken.transferFrom(address,address,uint256).\_value (../cointokenBNB/CoinToken.sol#146) is not in mixedCase

Parameter StandardToken.approve(address,uint256).\_spender (../cointokenBNB/CoinToken.sol#160) is not in mixedCase

Parameter StandardToken.approve(address,uint256).\_value (../cointokenBNB/CoinToken.sol#160) is not in mixedCase

Parameter StandardToken.approve(address,uint256).\_value (../cointokenBNB/CoinToken.sol#160) is not in mixedCase

Parameter StandardToken.approve(address,uint256).\_value (../cointokenBNB/CoinToken.sol#160) is not in mixedCase

Parameter StandardToken.allowance(address,address).\_owner (../cointokenBNB/CoinToken.sol#167) is not in mixedCase

Parameter StandardToken.allowance(address,address).\_owner (../cointokenBNB/CoinToken.sol#167) is not in mixedCase

Parameter StandardToken.allowance(address,address).\_spender (../cointokenBNB/CoinToken.sol#167) is not in mixedCase

Parameter StandardToken.allowance(address,address).\_spender (../cointokenBNB/CoinToken.sol#167) is not in mixedCase

Parameter StandardToken.increaseApproval(address,uint256).\_spender (../cointokenBNB/CoinToken.sol#172) is not in mixedCase

Parameter StandardToken.increaseApproval(address,uint256).\_spender (../cointokenBNB/CoinToken.sol#172) is not in mixedCase

Parameter StandardToken.increaseApproval(address,uint256).\_addedValue (../cointokenBNB/CoinToken.sol#172) is not in mixedCase

(../cointokenBNB/CoinToken.sol#172) is not in mixedCase  
Parameter StandardToken.decreaseApproval(address,uint256).\_spender  
(../cointokenBNB/CoinToken.sol#178) is not in mixedCase  
Parameter StandardToken.decreaseApproval(address,uint256).\_subtractedValue  
(../cointokenBNB/  
CoinToken.sol#178) is not in mixedCase  
Parameter PausableToken.transfer(address,uint256).\_to (../cointokenBNB/CoinToken.sol#204) is  
not in mixedCase  
Parameter PausableToken.transfer(address,uint256).\_value (../cointokenBNB/CoinToken.sol#204)  
is not in mixedCase  
Parameter PausableToken.transferFrom(address,address,uint256).\_from  
(../cointokenBNB/CoinToken.sol#208) is not in mixedCase  
Parameter PausableToken.transferFrom(address,address,uint256).\_to  
(../cointokenBNB/CoinToken.sol#208) is not in mixedCase  
Parameter PausableToken.transferFrom(address,address,uint256).\_value  
(../cointokenBNB/CoinToken.sol#208) is not in mixedCase  
Parameter PausableToken.approve(address,uint256).\_spender  
(../cointokenBNB/CoinToken.sol#212) is not in mixedCase  
Parameter PausableToken.approve(address,uint256).\_value (../cointokenBNB/CoinToken.sol#212)  
is not in mixedCase  
Parameter PausableToken.increaseApproval(address,uint256).\_spender  
(../cointokenBNB/CoinToken.sol#216) is not in mixedCase  
Parameter PausableToken.increaseApproval(address,uint256).\_addedValue  
(../cointokenBNB/CoinToken.sol#216) is not in mixedCase  
Parameter PausableToken.decreaseApproval(address,uint256).\_spender  
(../cointokenBNB/CoinToken.sol#220) is not in mixedCase  
Parameter PausableToken.decreaseApproval(address,uint256).\_subtractedValue  
(../cointokenBNB/  
CoinToken.sol#220) is not in mixedCase  
Parameter CoinToken.burn(uint256).\_value (../cointokenBNB/CoinToken.sol#248) is not in  
mixedCase  
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-soliditynaming-conventions>  
INFO:Detectors:  
transferOwnership(address) should be declared external:  
- Ownable.transferOwnership(address) (../cointokenBNB/CoinToken.sol#55-59)  
pause() should be declared external:  
- Pausable.pause() (../cointokenBNB/CoinToken.sol#89-92)  
unpause() should be declared external:  
- Pausable.unpause() (../cointokenBNB/CoinToken.sol#97-100)  
balanceOf(address) should be declared external:  
- ERC20Basic.balanceOf(address) (../cointokenBNB/CoinToken.sol#105)  
- StandardToken.balanceOf(address) (../cointokenBNB/CoinToken.sol#142-144)  
allowance(address,address) should be declared external:  
- ERC20.allowance(address,address) (../cointokenBNB/CoinToken.sol#111)  
- StandardToken.allowance(address,address) (../cointokenBNB/CoinToken.sol#167-169)  
blackListAddress(address,bool) should be declared external:  
- PausableToken.blackListAddress(address,bool) (../cointokenBNB/CoinToken.sol#224-226)  
burn(uint256) should be declared external:



This is a private and confidential document. No part of this document should be disclosed to third party without prior written permission of EtherAuthority.

**Email: [audit@EtherAuthority.io](mailto:audit@EtherAuthority.io)**