SOLIDITY AUDIT 

SMART CONTRACT CODE REVIEW AND SECURITY ANALYSIS REPORT

Customer: YsoyChain

Date: Apri 21st, 2021

This document may contain confidential information about IT systems and the intellectual property of the Customer as well as information about potential vulnerabilities and methods of their exploitation.

The report containing confidential information can be used internally by the Customer, or it can be disclosed publicly after all vulnerabilities fixed - upon a decision of the Customer.

Document

Name	Smart Contract Code Review and Security Analysis Report for YsoyChain.
Approved by	Solidity Audit
Type	Token, Defi
Platform	Binance Smart Chain / Solidity
Methods	Architecture Review, Functional Testing, Computer-Aided Verification, Manual Review
Repository	
Commit	
Deployed contract	

Table of contents

Introduction

Solidity Audit (Consultant) was contracted by YsoyChain (Customer) to conduct a Smart Contract Code Review and Security Analysis. This report presents the findings of the security assessment of Customer's smart contract and its code review conducted between February 18th, 2021 – February 21st, 2021.

Scope

The scope of the project is smart contracts in the repository:

Contract deployment address:
Repository
File:
yTofu.sol 0xb4c20Bb1C75300Fa724ec3196B5d1C854a7d58a0
SoyMill.sol 0xaE14db04Dcc3158dDE825Ccc1AcC365A796Fd279
ySoy.sol 0x57488Fcc3dC72Edb0a4c06a356c2c43C08BdfB42

We have scanned this smart contract for commonly known and more specific vulnerabilities. Here are some of the commonly known vulnerabilities that are considered:

Category	Check Item
Code review	▪ Reentrancy ▪ Ownership Takeover ▪ Timestamp Dependence ▪ Gas Limit and Loops ▪ DoS with (Unexpected) Throw ▪ DoS with Block Gas Limit ▪ Transaction-Ordering Dependence ▪ Style guide violation ▪ Costly Loop ▪ ERC20 API violation ▪ Unchecked external call ▪ Unchecked math ▪ Unsafe type inference ▪ Implicit visibility level ▪ Deployment Consistency ▪ Repository Consistency ▪ Data Consistency

Functional review	▪ Business Logics Review ▪ Functionality Checks ▪ Access Control & Authorization ▪ Escrow manipulation ▪ Token Supply manipulation ▪ Assets integrity ▪ User Balances manipulation ▪ Kill-Switch Mechanism ▪ Operation Trails & Event Generation

Executive Summary

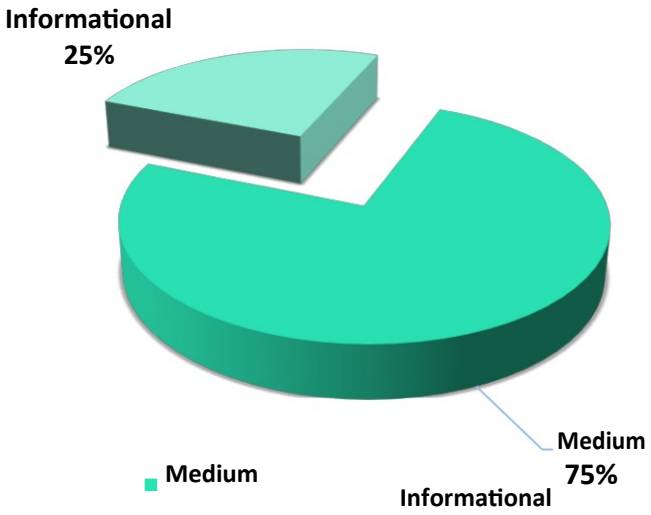
According to the assessment, the Customer's smart contracts are well-secured.

Our team performed an analysis of code functionality, manual audit, and automated checks with Mythril and Slither. All issues found during automated analysis were manually reviewed, and important vulnerabilities are presented in the Audit overview section. A general overview is presented in AS-IS section, and all found issues can be found in the Audit overview section.

Security engineers found **2** medium, **1** informational issue during the audit.

Notice: the audit scope is limited and not include all files in the repository. Though, reviewed contracts are secure, we may not guarantee secureness of contracts that are not in the scope.

Graph 1. The distribution of vulnerabilities after the first review.



Severity Definitions

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

SoyMill.sol

Description

SoyMill is a liquidity pool with rewards in yTofu token.

Imports

SoyMill has following imports:

- @openzeppelin/contracts/math/SafeMath.sol
- ./libs/IBEP20.sol
- ./libs/SafeBEP20.sol
- @openzeppelin/contracts/access/Ownable.sol
- ./yTofu.sol

Inheritance

SoyMill is Ownable.

Usages

SoyMill contract has following usages:

- SafeMath for uint256
- SafeBEP20 for IBEP20

Structs

SoyMill contract has following data structures:

- UserInfo
- PoolInfo

Enums

SoyMill contract has no enums.

Events

SoyMill contract has following events:

- Deposit
- Withdraw
- EmergencyWithdraw

Modifiers

SoyMill has no custom modifiers.

Fields

SoyMill contract has following fields and constants:

- yTofu public yTofu
- address public devaddr
- uint256 public yTofuPerBlock
- uint256 public constant BONUS_MULTIPLIER = 1
- address public feeAddress
- PoolInfo[] public poolInfo
- mapping (uint256 => mapping (address => UserInfo)) public userInfo
- uint256 public totalAllocPoint = 0
- uint256 public startBlock

Functions

SoyMill has following public functions:

- ***constructor***
  Description
  Sets initial values of the contract.
  Visibility
  public
  Input parameters
  - yTofu _yTofu,
  - address _devaddr
  - address _feeAddress
  - uint256 _yTofuPerBlock
  - uint256 _startBlock

Constraints

None

Events emit

None

Output

None

- ***poolLength***

  Description

  Returns a number of pools.

  Visibility

  external view

  Input parameters

  None

  Constraints

  None

  Events

  emit None

  Output

  - uint256 – a number of pools.

- ***changeFactor***

  Description

  Updates the *rewardTimeFactor*.

  Visibility

  public

  Input parameters

  None

  Constraints

  - onlyOwner modifier.

  Events

  emit None

  Output

  None

- ***add***

  Description

  Add a new lp to the pool.

  Visibility

  public

  Input parameters

  - uint256 _allocPoint
  - IERC20 _lpToken

- uint16 _depositFeeBP
- bool _withUpdate

Constraints

- onlyOwner modifier.

Events
emit None

Output
None

- ***set***
  Description
  Update the given pool's allocation point
  Visibility
  public
  Input parameters
  - uint256 _pid
  - uint256 _allocPoint
  - bool _withUpdate

  Constraints
  - onlyOwner modifier.

  Events
  emit None

  Output
  None
- ***getMultiplier***
  Description
  Return reward multiplier over the given _from to _to block.
  Visibility
  Public view
  Input parameters
  - uint256 from
  - uint256 to

  Constraints
  None
  Events
  emit None
  Output
  - uint256 – requested multiplier.
- ***pendingyTo***
  fu
  Description

Returns pending reward tokens of a _user for a _pid reward pool.

Visibility

external view

Input parameters

- uint256 _pid
- address _user

Constraints

None

Events emit

None

Output

- uint256 – available tokens.

- ***massUpdatePools***

Description

Update reward variables for all pools.

Visibility

public

Input parameters

None

Constraints

None

Events

emit None

Output

None

- ***updatePool***

Description

Update reward variables of the given pool to be up-to-date.

Visibility

public

Input parameters

- uint256 _pid

Constraints

None

Events emit

None

Output

None

- ***deposit***

Description

Deposit LP tokens.

Visibility
public
Input parameters
- uint256 _pid
- uint256 _amount

Constraints
None
Events emit
Emits the Deposit event.
Output
None

- ***withdraw***
Description
Withdraw LP tokens.
Visibility
public
Input parameters
  - uint256 _pid
  - uint256 _amount

Constraints
  - An _amount should not exceed a user balance of a _pid pool

Events emit
Emits the Withdraw event.
Output
None

- ***emergencyWithdraw***
Description
Withdraw LP tokens without a reward.
Visibility
public
Input parameters
  - uint256 _pid

Constraints
None
Events emit
Emits the EmergencyWithdraw event.
Output
None

- ***dev***
Description

Allows dev address to set another dev address.

- ***setFeeAddress***
  Description
  Allows fee address to set another fee address.
- ***updateEmissionRate***
  Description
  Mass update pool and sets new yTofuPerBlock value.
  Visibility
  public
  Input parameters
  - uint256 _yTofuPerBlock

  Constraints
  - onlyOwner modifier.

  Events
  emit None
  Output
  None

yTofu.sol

Description

yTofu is a token with following parameters:

- Name: yTofu
- Symbol: yTOFU
- Decimals: 18

The yTofu has voting functionality.

Imports

yTofu contract has following imports:

- ./libs/BEP20.sol

Inheritance

yTofu contract is BEP20.

Usages

yTofu contract has no custom usages.

Structs

yTofu contract has following data structures:

- struct Checkpoint – stores votes checkpoints.

Enums

yTofu contract has no custom enums.

Events

yTofu contract has following custom evets:

- event DelegateChanged(address indexed delegator, address indexed fromDelegate, address indexed toDelegate)
- event DelegateVotesChanged(address indexed delegate, uint256 previousBalance, uint256 newBalance)

Modifiers

yTofu has no custom modifiers.

Fields

yTofu contract has following fields and constants:

- mapping (address => mapping (uint32 => Checkpoint)) public checkpoints
- mapping (address => uint32) public numCheckpoints
- bytes32 public constant DOMAIN_TYPEHASH = keccak256("EIP712Domain(string name,uint256 chainId,address verifyingContract)")
- bytes32 public constant DELEGATION_TYPEHASH = keccak256("Delegation(address delegatee,uint256 nonce,uint256 expiry)")
- mapping (address => uint) public nonces

Functions

yTofu has following public functions:

- ***delegates***
  Description
  Returns an address to whom *delegator* delegates his votes.
  Visibility
  external view

Input parameters

- address delegator

Constraints
None

Events
emit None

Output

- address

- ***delegate***
  Description
  Delegate votes from *msg.sender* to *delegate*.
  Visibility
  external
  Input parameters
  - address delegatee

  Constraints
  None
  Events emit
  Emits *DelegateChanged* event.
  Output
  None

- ***delegateBySig***
  Description
  Delegates votes from signatory to *delegatee*.
  Visibility
  public
  Input parameters
  - address delegate
  - uint256 nonce
  - uint256 expiry
  - uint8 v
  - bytes32 r
  - bytes32 s

  Constraints
  None
  Events emit
  Emits *DelegateChanged* event.
  Output
  None

- ***getCurrentVotes***
  Description
  Get current votes balance for *account*.
  Visibility
  external view
  Input parameters
    - address account

  Constraints
  None
  Events
  emit None
  Output
    - uint256 — number of current votes for *account*.

- ***getPriorVotes***
  Description
  Determine the prior number of votes for an *account* as of a *blockNumber*.
  Visibility
  public view
  Input parameters
    - address account
    - uint256 blockNumber

  Constraints
  None
  Events
  emit None
  Output
    - uint256 — number of votes the account had as of the given block.

- ***mint***
  Description
  Mints an *_amount* to *_to* address.
  Visibility
  public
  Input parameters
    - address _to
    - uint256 _amount

  Constraints
    - *onlyOwner* modifier.

  Events emit

None

Output

None

ySoy.sol

Description

ySoy is a token with following parameters:

- Name: ySoy
- Symbol: ySoy
- Decimals: 18

The yTofu has voting functionality.

Imports

yTofu contract has following imports:

- ./libs/BEP20.sol

Inheritance

ySoy contract is BEP20.

Usages

ySoy contract has no custom usages.

Structs

ySoy contract has following data structures:

- struct Checkpoint – stores votes checkpoints.

Enums

ySoy contract has no custom enums.

Events

ySoy contract has following custom evets:

- event DelegateChanged(address indexed delegator, address indexed fromDelegate, address indexed toDelegate)
- event DelegateVotesChanged(address indexed delegate, uint256 previousBalance, uint256 newBalance)

Modifiers

ySoy has no custom modifiers.

Fields

ySoy contract has following fields and constants:

- mapping (address => mapping (uint32 => Checkpoint)) public checkpoints
- mapping (address => uint32) public numCheckpoints
- bytes32 public constant DOMAIN_TYPEHASH = keccak256("EIP712Domain(string name,uint256 chainId,address verifyingContract)")
- bytes32 public constant DELEGATION_TYPEHASH = keccak256("Delegation(address delegatee,uint256 nonce,uint256 expiry)")
- mapping (address => uint) public nonces

Functions

ySoy has following public functions:

- ***delegates***
  Description
  Returns an address to whom *delegator* delegates his votes.
  Visibility
  external view

Input parameters

- address delegator

Constraints
None

Events
emit None

Output

- address

- ***delegate***
  Description
  Delegate votes from *msg.sender* to *delegate*.
  Visibility
  external
  Input parameters
  - address delegatee

  Constraints
  None
  Events emit
  Emits *DelegateChanged* event.
  Output
  None

- ***delegateBySig***
  Description
  Delegates votes from signatory to *delegatee*.
  Visibility
  public
  Input parameters
  - address delegate
  - uint256 nonce
  - uint256 expiry
  - uint8 v
  - bytes32 r
  - bytes32 s

  Constraints
  None
  Events emit
  Emits *DelegateChanged* event.
  Output
  None

- ***getCurrentVotes***
  Description
  Get current votes balance for *account*.
  Visibility
  external view
  Input parameters
  - address account

  Constraints
  None
  Events
  emit None
  Output
  - uint256 — number of current votes for *account*.

- ***getPriorVotes***
  Description
  Determine the prior number of votes for an *account* as of a *blockNumber*.
  Visibility
  public view
  Input parameters
  - address account
  - uint256 blockNumber

  Constraints
  None
  Events
  emit None
  Output
  - uint256 — number of votes the account had as of the given block.

- ***mint***
  Description
  Mints an *_amount* to *_to* address.
  Visibility
  public
  Input parameters
  - address _to
  - uint256 _amount

  Constraints
  - *onlyOwner* modifier.

  Events emit

None

Output

None

Audit overview

Critical

No critical issues were found.

High

No high severity issues were found.

Medium

1. The *add* function of the *SoyMill* contract is lack of validations for the *_lpToken* existence.

2. The *updateEmissionRate* function of the *SoyMill* can fail due to block gas limit if the pool size is big enough.

Low

No low severity issues were found.

Lowest / Code style / Best Practice

1. Some code style issues were found by the static code analyzers.

Conclusion

Smart contracts within the scope were manually reviewed and analyzed with static analysis tools. For the contract, 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 engineers found **2** medium, **1** informational issue during the audit.

Notice: the audit scope is limited and not include all files in the repository. Though, reviewed contracts are secure, we may not guarantee secureness of contracts that are not in the scope.

Violations in the following categories were found and addressed to Customer:

Category	Check Item	Comments
Code review	▪ Costly loops	▪ Execution of the updateEmissionRate function of the SoyMill may fail due to block gas limit
	▪ Data consistency	▪ The add function of the SoyMill is lack of _lpToken validation.

Disclaimers

Solidity Audit Disclaimer

The smart contracts given for audit have been analyzed 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).

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 recommend proceeding with several independent audits and a public bug bounty program to ensure security of smart contracts.

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 its vulnerabilities that can lead to hacks. Thus, the audit can't guarantee the explicit security of the audited smart contracts.