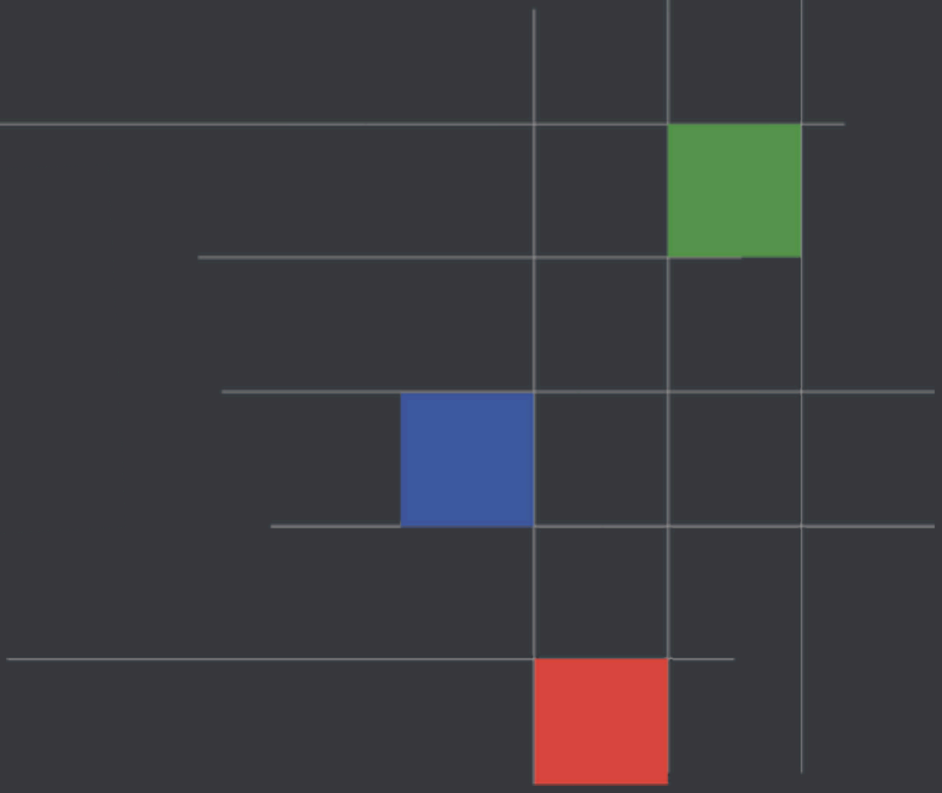
CheeseSwap AMM

Security Assessment

March 23th, 2021

For :
CheeseSwap



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What is a CertiK report?

- A document describing in detail an in depth analysis of a particular piece(s) of source code provided to CertiK by a Client.
- An organized collection of testing results, analysis and inferences made about the structure, implementation and overall best practices of a particular piece of source code.
- Representation that a Client of CertiK has indeed completed a round of auditing with the intention to increase the quality of the company/product’s IT infrastructure and or source code.

Overview

Project Summary

Project Name	CheeseSwap
Description	DeFi, AMM
Platform	Binance Smart Chain; Solidity
Codebase	BSC Explorer
Commit	CheeseFarm.sol: b4e78b47d0bf5223cc18ba85628f63e571d359fe4bc3773e704cbf4cc7b21030 CheeseSwapFactory.sol: 9806c26634ab297d5171d3998bd0d9e1417e710108ca2feccfa857889a69e8fa CheeseSwapRouter.sol: 78c4cae7a999bc74813f756c6629637459be85d2326cbf89fb32c589fb7ab082

Audit Summary

Delivery Date	Mar. 23th, 2021
Method of Audit	Static Analysis, Manual Review
Consultants Engaged	2
Timeline	Mar. 8th, 2021 - Mar. 14th, 2021, Mar. 19, 2021, Mar. 23, 2021

Vulnerability Summary

Total Issues	4
🔴 **Total Critical**	0
🟠 **Total Major**	0
🟠 **Total Medium**	0
🔵 **Total Minor**	1
🟢 **Total Informational**	3

Executive Summary

This report has been prepared for **CheeseSwap AMM** smart contract to discover issues and vulnerabilities in the source code of their Smart Contract as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Dynamic Analysis, 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.

To initial setup project correctly, improve overall project quality, preserve the upgradability, the following functions, which are `feeToSetter` role, are adopted in the codebase:

- `setFeeTo()` to update address of `feeTo` in smart contract `CheeseSwapFactory.sol`.
- `setFeeToSetter()` to update value of `feeToSetter` role in smart contract `CheeseSwapFactory.sol`.

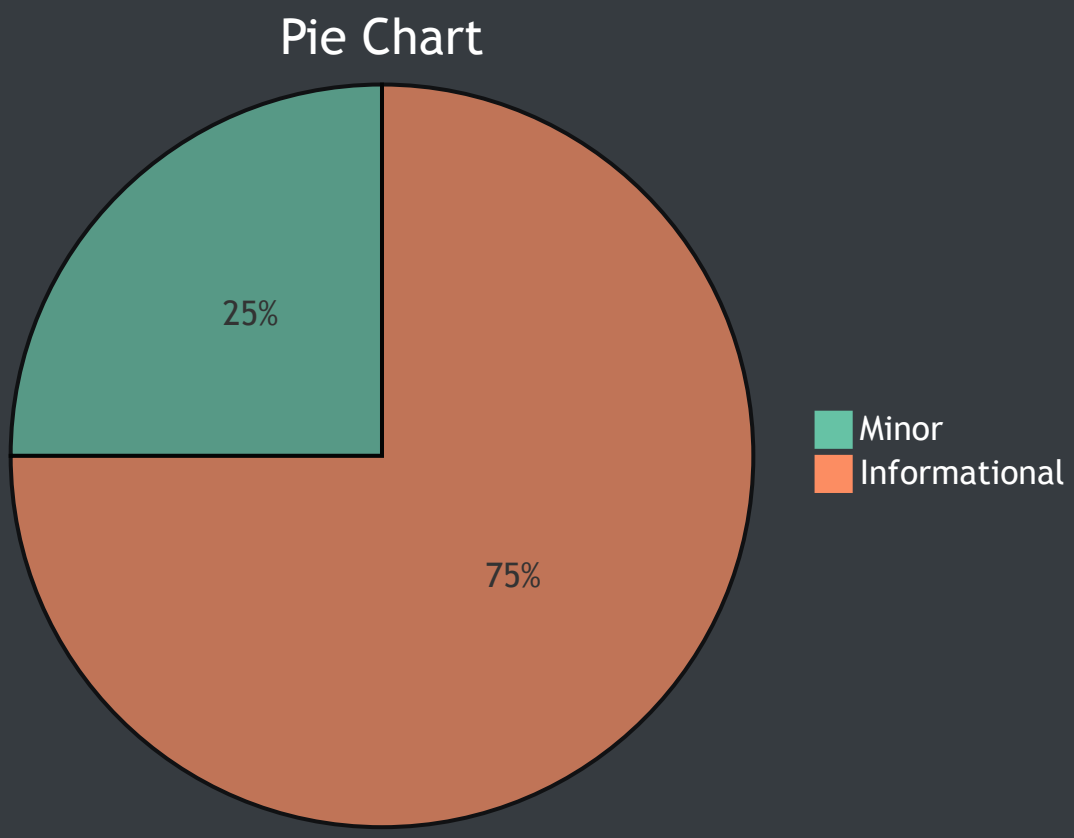
The advantage of the above functions in the codebase is that the client reserves the ability to adjust the project according to the runtime require to best serve the community. It is also worthy of note the potential drawbacks of these functions, which should be clearly stated through client's action/plan on how to prevent abusage of the these functionalities

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

File in Scope

ID	Contract	SHA-256 Checksum
CSF	CheeseSwapFactory.sol	9806c26634ab297d5171d3998bd0d9e1417e710108ca2feccfa857889a69e8fa
CSR	CheeseSwapRouter.sol	78c4cae7a999bc74813f756c6629637459be85d2326cbf89fb32c589fb7ab082

Findings



ID	Title	Type	Severity	Resolved
CSF-01	Lack of input validation	Logical Issue	Minor	!
CSF-02	Lack of Input Validation	Logical Issue	Informational	!
CSF-03	Missing Emit Events	Optimization	Informational	!
CSR-01	Proper Usage of `public` and `external` type	Optimization	Informational	!

CSF-01: Lack of input validation

Type	Severity	Location
Logical Issue	Minor	CheeseSwapFactory.sol L466

Description:

Missing validation for the input variables `_feeToSetter` in constructor of `CheeseSwapFactory` contract

Recommendation:

Please ensure the `_feeToSetter` is not equal to `address(0)`

```
constructor(address _feeToSetter) public {
    require(_feeToSetter != address(0), "feeToSetter should not be address(0)");
    feeToSetter = _feeToSetter;
}
```

Alleviation:

N/A

CSF-02: Lack of Input Validation

Type	Severity	Location
Volatile Code	Informational	CheeseSwapFactory.sol:L396, L397

Description:

The value of `totalSupply` in L395 should be validated as non zero value. `totalSupply` will be used as denominator in division operation in L396 and L396.

Recommendation:

We advise client to use OpenZeppelin's SafeMath library for all of the `int` operations.

Reference:
https://github.com/OpenZeppelin/openzeppelin-contracts/blob/release-v2.5.0/contracts/math/SafeMath.sol

Alleviation:

N/A

CSF-03: Missing Emit Events

Type	Severity	Location
Optimization	Informational	CheeseSwapFactory.sol: L491, L496

Description:

Function that affect the status of sensitive variables should be able to emit events as notifications to customers:

- `setFeeTo()`
- `setFeeToSetter()`

Recommendation:

We advise client to consider adding events for sensitive actions, and emit them in the function.

```
event SetFeeToSetter(address indexed user, address indexed _account);

function setFeeToSetter(address _feeToSetter) external {
    require(msg.sender == feeToSetter, 'CheeseSwap: FORBIDDEN');
    feeToSetter = _feeToSetter;
    emit SetFeeToSetter(msg.sender, feeToSetter)
}
```

Alleviation:

N/A

CSR-01: Proper Usage of `public` and `external` type

Type	Severity	Location
Optimization	Informational	CheeseSwapRouter.sol:L744,L748,L758,L768,L779

Description:

`public` functions that are never called by the contract could be declared `external` . When the inputs are arrays `external` functions are more efficient than "public" functions.

Examples:

- `quote()`
- `getAmountOut()`
- `getAmountIn()`
- `getAmountsOut()`
- `getAmountsIn()`

Recommendation:

Consider using the "external" attribute for functions never called from the contract.

Alleviation:

N/A

Appendix

Finding Categories

Gas Optimization

Gas Optimization findings refer to exhibits that do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

Mathematical Operations

Mathematical Operation exhibits entail findings that relate to mishandling of math formulas, such as overflows, incorrect operations etc.

Logical Issue

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

Control Flow

Control Flow findings concern the access control imposed on functions, such as owner-only functions being invoke-able by anyone under certain circumstances.

Volatile Code

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

Data Flow

Data Flow findings describe faults in the way data is handled at rest and in memory, such as the result of a `struct` assignment operation affecting an in-memory `struct` rather than an instorage one.

Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of `private` or `delete` .

Coding Style

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

Inconsistency

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

Magic Numbers

Magic Number findings refer to numeric literals that are expressed in the codebase in their raw format and should otherwise be specified as `constant` contract variables aiding in their legibility and maintainability.

Compiler Error

Compiler Error findings refer to an error in the structure of the code that renders it impossible to compile using the specified version of the project.

Dead Code

Code that otherwise does not affect the functionality of the codebase and can be safely omitted.

Icons explanation

 : Issue resolved

 : Issue not resolved / Acknowledged. The team will be fixing the issues in the own timeframe.

 : Issue partially resolved. Not all instances of an issue was resolved.