SOLIDProof

Bring trust into your projects

Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

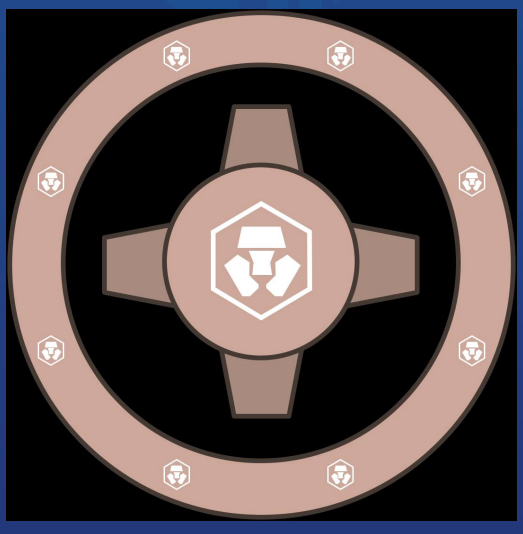
CroBank

Audit

Security Assessment

06. April, 2022

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
Inheritance Graph 13
CallGraph 14
Scope of Work/Verify Claims 15
Modifiers and public functions 18
Source Units in Scope 21
Critical issues 22
High issues 22
Medium issues 22
Low issues 22
Informational issues 23
Commented Code exist 23
Audit Comments 24
SWC Attacks 25

Disclaimer

SolidProof.io reports are not, nor should be considered, an “endorsement” or “disapproval” of any particular project or team. These reports are not, nor should be considered, an indication of the economics or value of any “product” or “asset” created by any team. SolidProof.io do not cover testing or auditing the integration with external contract or services (such as Unicrypt, Uniswap, PancakeSwap etc’...)

SolidProof.io Audits do not provide any warranty or guarantee regarding the absolute bug- free nature of the technology analyzed, nor do they provide any indication of the technology proprietors. SolidProof Audits should not be used in any way to make decisions around investment or involvement with any particular project. These reports in no way provide investment advice, nor should be leveraged as investment advice of any sort.

SolidProof.io Reports represent an extensive auditing process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology. Blockchain technology and cryptographic assets present a high level of ongoing risk. SolidProof’s position is that each company and individual are responsible for their own due diligence and continuous security. SolidProof in no way claims any guarantee of security or functionality of the technology we agree to analyze.

Version	Date	Description
1.0	06. April 2022	• Layout project • Automated- /Manual-Security Testing • Summary

Network
Cronos

Website
https://crobank.net/

Telegram
https://t.me/cro_bank

Twitter
https://twitter.com/cro_bank

Medium
https://crobank.medium.com/

Discord
https://discord.com/invite/jtFxHysS7J

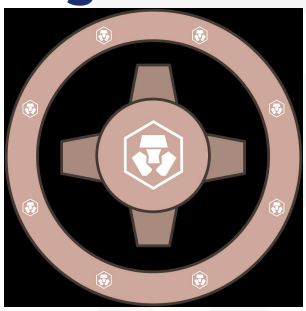
Description

CroBank offers the most innovative products on the Cronos ecosystem, a rewards DEX and rewards token with limitless utilities.

Project Engagement

During the 31st of March 2022, **CroBank 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. They provided Solidproof.io with access to their code repository and whitepaper.

Logo



Contract Link

v1.0

- Provided as files

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 aspossible.
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.

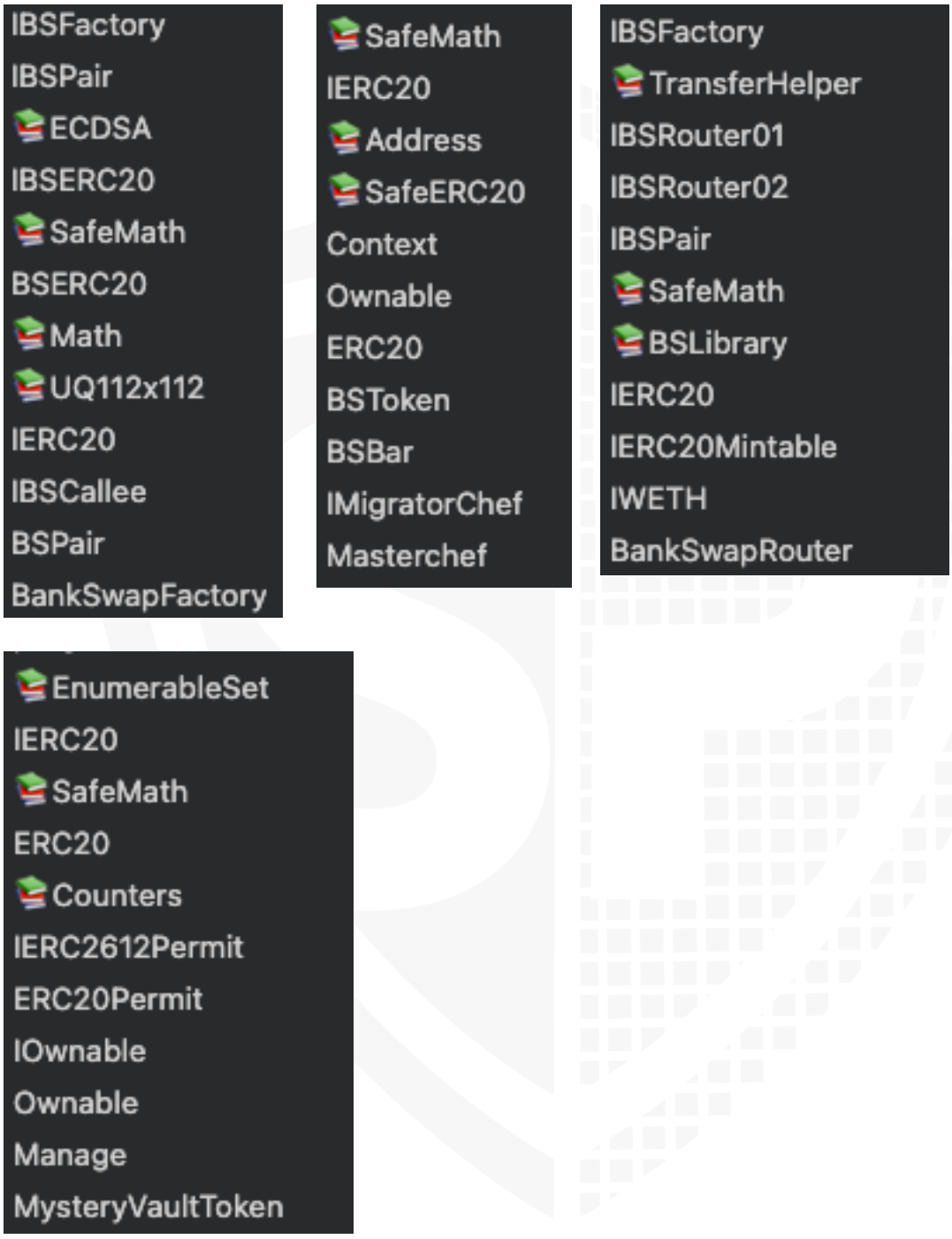
2. Testing and automated analysis that includes the following:
    i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
    ii) Symbolic execution, which is analysing a program 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:



Tested Contract Files

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

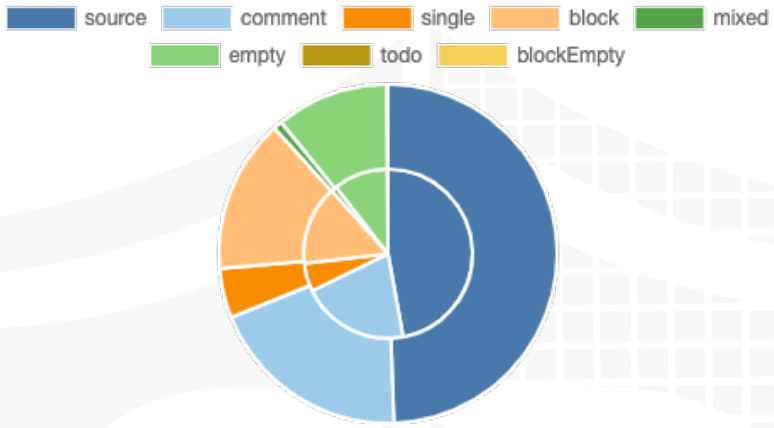
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

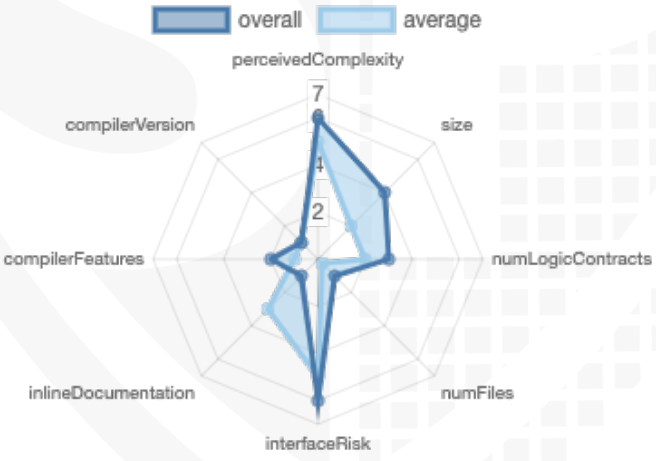
File Name	SHA-1 Hash
contracts/MasterChef.sol	ca3e393d2a50a66e38c3809b6a34210a9b65840b
contracts/Router.sol	1ad3a121b651bcc891e4b606a46976ff8324a755
contracts/VaultToken.sol	cc2b382da41784dfad1f53af72f7ef0a9fb75a00
contracts/Factory.sol	c520301466d01e40d706f268d43b9a5482145660

Metrics

Source Lines
v1.0



Risk Level
v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	11	13	17	4

Exposed Functions

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

Version	Public	Payable
1.0	255	10

Version	External	Internal	Private	Pure	View
1.0	183	325	15	68	117

State Variables

Version	Total	Public
1.0	68	44

Capabilities

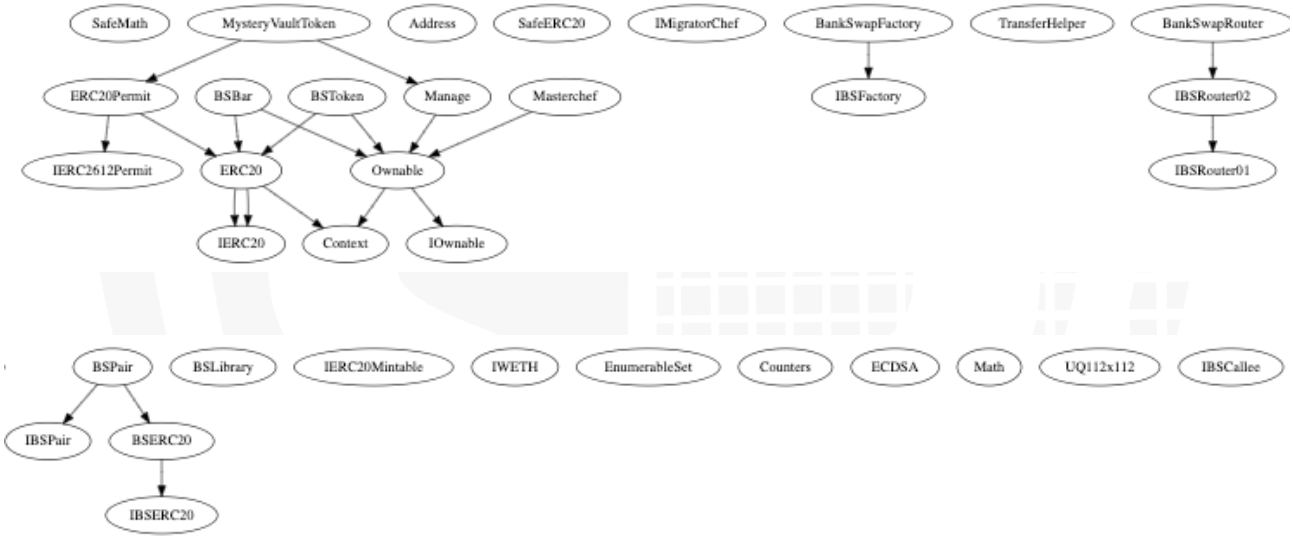
Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	`>=0.6.0 <0.8.0` `>=0.6.2 <0.8.0` `0.6.12` `=0.6.6` `0.7.5` `=0.5.16`		`yes`	`yes` (6 asm blocks)	

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	EC Recover	New/Create/Create2

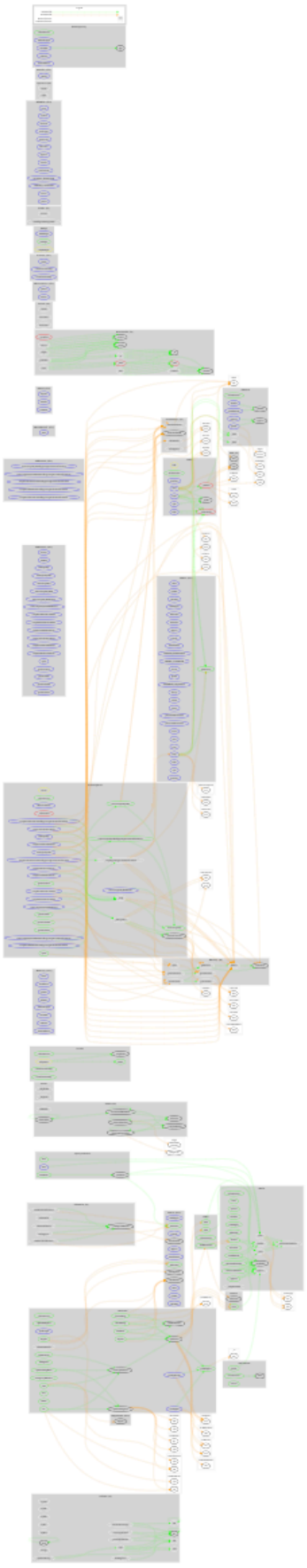
1.0	yes		yes	yes	yes	yes → AssemblyCall:Name:create2

Inheritance Graph

v1.0



CallGraph
v1.0



Scope of Work/Verify Claims

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. Overall checkup (Smart Contract Security)

Write functions of contract v1.0

createPair
setFeeTo
setFeeToSetter

updateMultiplier
add
set
setEmissions
setMigrator
migrate
massUpdatePools
updatePool
deposit
withdraw
enterStaking
leaveStaking
emergencyWithdraw
dev
master
updateStakingRatio
renounceOwnership
transferOwnership

mint
burn
burnFrom
_burnFrom
setManager
renounceOwnership
transferOwnership

addLiquidity
addLiquidityETH
removeLiquidity
removeLiquidityETH
removeLiquidityWithPermit
removeLiquidityETHWithPermit
removeLiquidityETHSupportingFeeOnT...
removeLiquidityETHWithPermitSuppor...
swapExactTokensForTokens
swapTokensForExactTokens
swapExactETHForTokens
swapTokensForExactETH
swapExactTokensForETH
swapETHForExactTokens
swapExactTokensForTokensSupporting...
swapExactETHForTokensSupportingFe...
swapExactTokensForETHSupportingFe...

Overall checkup (Smart Contract Security)

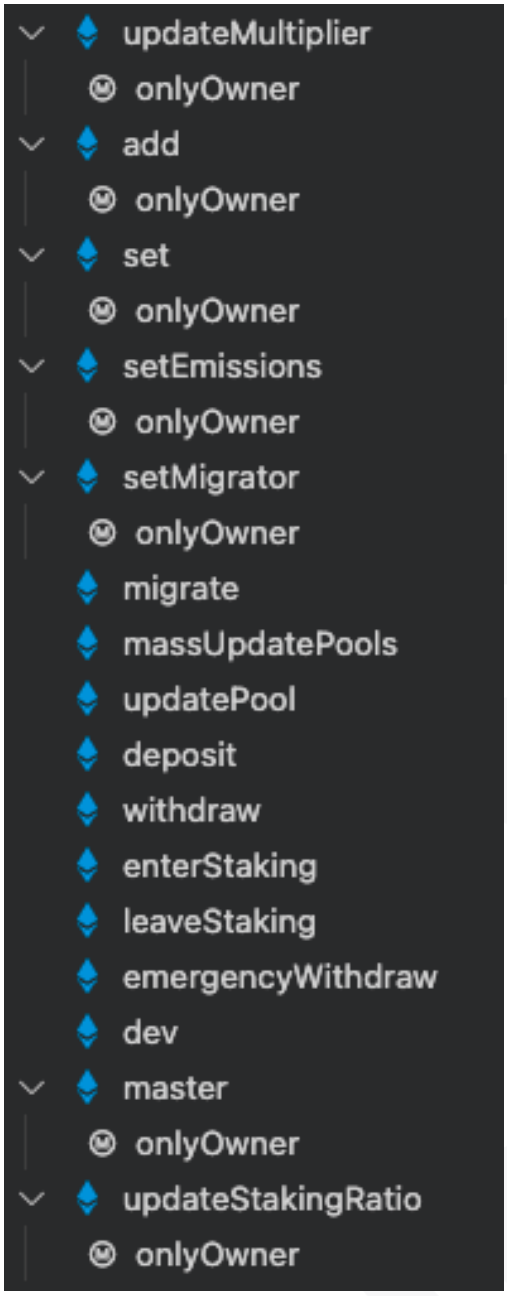
Tested	Verified
✓	✓

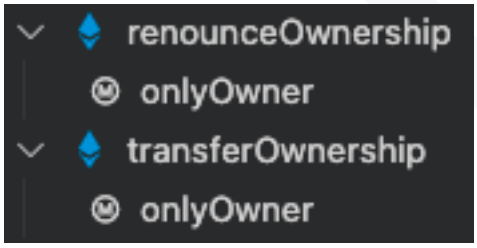
Legend

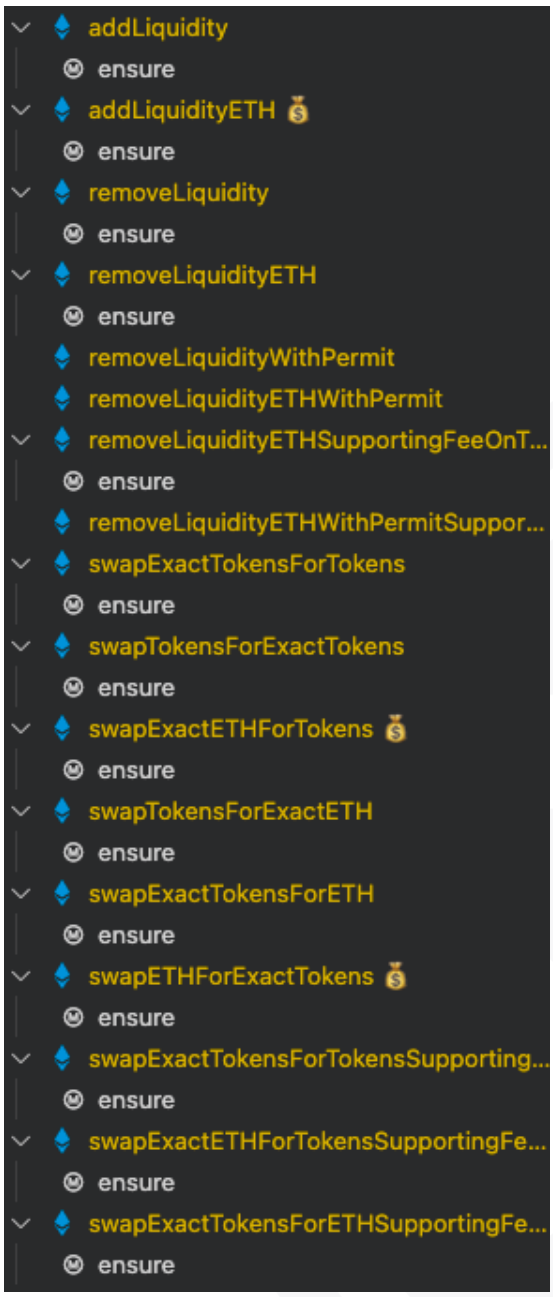
Attribute	Symbol
Verfified / Checked	✓
Partly Verified	⚑
Unverified / Not checked	✗
Not available	-

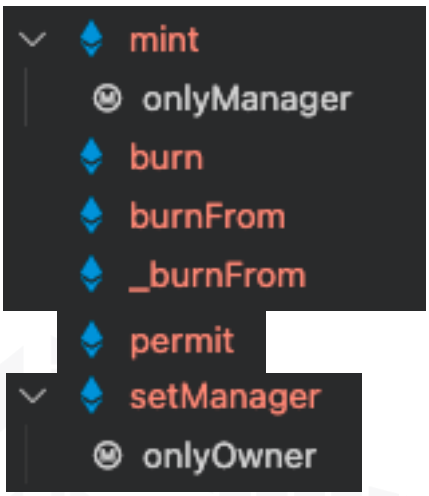
Modifiers and public functions

v1.0









Comments

- Deployer can set following state variables without any limitations
  - BONUS_MULTIPLIER
  - poolInfo[_pid].allocPoint
  - poolInfo[_pid].bankPoint
  - bsPerBlock
  - bankPerBlock
  - bsStakingRatio

- Deployer can set following addresses
  - feeTo
  - feeToSetter
  - migrator
  - devaddr

    - masteraddr

- Owner can create new poolInfo
- OnlyManager can mint new vault tokens
- Anybody can burn vault tokens

Please check if an OnlyOwner or similar restrictive modifier has been forgotten.

Source Units in Scope
v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
📝📚🔍🎨	contracts/MasterChef.sol	9	2	1447	1363	659	647	513	💻💠👥🔆
📝📚🔍	contracts/Router.sol	4	7	1387	716	620	42	647	💰💠🧱
📝📚🔍🎨	contracts/VaultToken.sol	8	3	903	824	450	273	300	💻🧱🔆
📝📚🔍	contracts/Factory.sol	7	5	615	500	349	110	468	💻🧱🔆🌀
📝📚🔍🎨	**Totals**	**28**	**17**	**4352**	**3403**	**2078**	**1072**	**1928**	💻💰💠👥🧱🔆🌀

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

High issues

No high issues

Medium issues

No medium issues

Low issues

Issue	File	Type	Line	Description
#1	Main	Contract doesn't import npm packages from source (like OpenZeppelin etc.)	-	We recommend to import all packages from npm directly without flatten the contract. Functions could be modified or can be susceptible to vulnerabilities
#2	MasterChef	A floating pragma is set	9, 227, 308, 501, 578, 606, 677	The current pragma Solidity directive is „"^0."".
#3	Factory	Missing Zero Address Validation (missing-zero-check)	430, 581, 606, 611,	Check that the address is not zero
#4	Router	Missing Zero Address Validation (missing-zero-check)	646-650,	Check that the address is not zero
#5	VaultToken	Missing Zero Address Validation (missing-zero-check)	859	Check that the address is not zero

#6	MasterChef	Missing Zero Address Validation (missing-zero-check)	1121, 1122, 1426, 1432	Check that the address is not zero
#7	MasterChef	Missing Events Arithmetic	1166, 1167, 1189, 1190, 1197, 1198, 1152	Emit an event for critical parameter changes
#8	VaultToken	Missing Events Arithmetic	860	Emit an event for critical parameter changes

Informational issues

Issue	File	Type	Line	Description
#1	Router	Functions that are not used	663	Remove unused functions
#2	MasterChef	Functions that are not used	1421	Remove unused functions
#3	VaultToken	Unused state variables	609	Remove unused state variables
#4	Main	Misspelling	See description	Change following words: - Make sure to change it everywhere else as well.
#5	VaultToken	Error message is missing	124	Provide an error message for require statement

Commented Code exist

There are some instances of code being commented out in the following files that should be removed:

File	Line	Comment
VaultToken	551	// assert(a == b * c + a % b); // There is no case in which this doesn't hold
	765	// keccak256("Permit(address owner,address spender,uint256 value,uint256 nonce,uint256 deadline)");

Recommendation

Remove the commented code, or address them properly.

Audit Comments

We recommend you to use the special form of comments (NatSpec Format, Follow link for more information https://docs.soliditylang.org/en/v0.5.10/natspec-format.html) for your contracts to provide rich documentation for functions, return variables and more. This helps investors to make clear what that variables, functions etc. do.

06. April 2022:

- Read whole report for more information

SWC Attacks

ID	Title	Relationships	Status
SWC-136	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
SWC-135	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
SWC-134	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
SWC-133	Hash Collisions With Multiple Variable Length Arguments	CWE-294: Authentication Bypass by Capture-replay	PASSED
SWC-132	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
SWC-131	Presence of unused variables	CWE-1164: Irrelevant Code	NOT PASSED
SWC-130	Right-To-Left-Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
SWC-129	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
SWC-128	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SWC-127	Arbitrary Jump with Function Type Variable	CWE-695: Use of Low-Level Functionality	PASSED
SWC-125	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
SWC-124	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
SWC-123	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
SWC-122	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
SWC-121	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
SWC-120	Weak Sources of Randomness from Chain Attributes	CWE-330: Use of Insufficiently Random Values	PASSED
SWC-119	Shadowing State Variables	CWE-710: Improper Adherence to Coding Standards	PASSED
SWC-118	Incorrect Constructor Name	CWE-665: Improper Initialization	PASSED
SWC-117	Signature Malleability	CWE-347: Improper Verification of Cryptographic Signature	PASSED

SWC-116	Timestamp Dependence	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SWC-115	Authorization through tx.origin	CWE-477: Use of Obsolete Function	PASSED
SWC-114	Transaction Order Dependence	CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')	PASSED
SWC-113	DoS with Failed Call	CWE-703: Improper Check or Handling of Exceptional Conditions	PASSED
SWC-112	Delegatecall to Untrusted Callee	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SWC-111	Use of Deprecated Solidity Functions	CWE-477: Use of Obsolete Function	PASSED
SWC-110	Assert Violation	CWE-670: Always-Incorrect Control Flow Implementation	PASSED
SWC-109	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
SWC-108	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED
SWC-107	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SWC-106	Unprotected SELFDESTRUCT Instruction	CWE-284: Improper Access Control	PASSED

SWC-105	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
SWC-104	Unchecked Call Return Value	CWE-252: Unchecked Return Value	PASSED
SWC-103	Floating Pragma	CWE-664: Improper Control of a Resource Through its Lifetime	NOT PASSED
SWC-102	Outdated Compiler Version	CWE-937: Using Components with Known Vulnerabilities	PASSED
SWC-101	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
SWC-100	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED

Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY