



SOLIDProof
Bring trust into your projects

Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

Audit

Security Assessment
25. November, 2021

For



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

Network

Cronos

Website

<https://croblackbird.finance/>

Telegram

https://t.me/black_bird_farm_cro

Twitter

<https://twitter.com/BlackBirdFin>



Description

BlackBird Finance, a new Defi protocol powered by Cronos Network to offer exciting features to the Defi community of Cronos to earn better yields and profits. BlackBird offers many exciting features such as Auto-Compounding, Vaults which are required for an ideal Yield farm farming project. Black Bird also offers BlackBird NFT to its holders as an incentive. BlackBird has a team of six with many years of experience as developers and marketing experts. BlackBird is built to provide a more transparent and secure Yield farming experience to the Cronos Defi community.

Project Engagement

During the 23rd of November 2021, **Bird 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. They provided Solidproof.io with access to their code repository and whitepaper.

Logo



Contract Link v1.0

Bird Token: <https://cronos.crypto.org/explorer/address/0x9A3d8759174f2540985aC83D957c8772293F8646/contracts>

MasterChef: <https://cronos.crypto.org/explorer/address/0xDF937094C6f2B757Dfd1265e5e1550Ea0055b27A/contracts>



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:

```
Context
Ownable
 SafeMath
IERC20
 Address
 SafeERC20
ReentrancyGuard
ERC20
```

Tested Contract Files

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

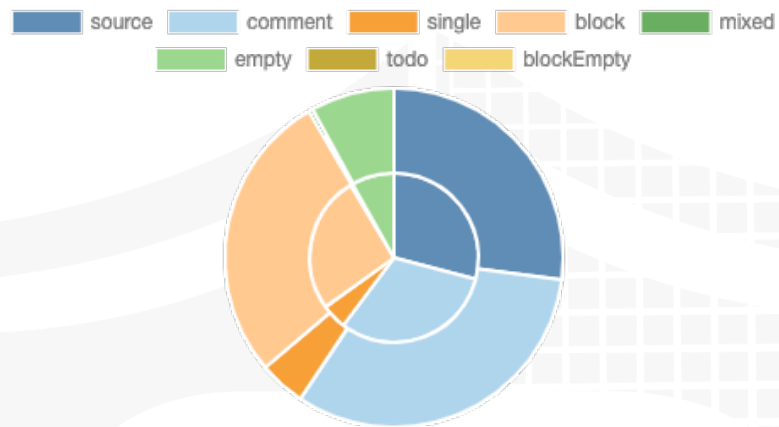
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

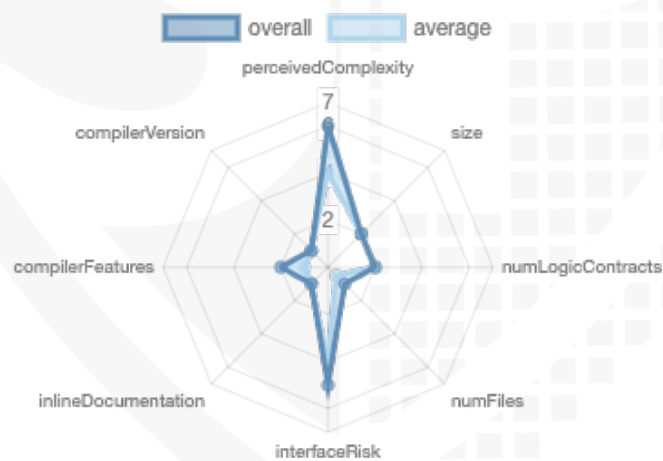
File Name	SHA-1 Hash
contracts/birdtoken.sol	37910f79108b8f05d5bfe25c2fa7ac4d41621db0
contracts/MasterChef.sol	653f0523690403c45e0aa63c468872f19b2fe230

Metrics

Source Lines v1.0



Risk Level v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	8	5	2	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.

Version	Public	Payable
1.0	72	0

Version	External	Internal	Private	Pure	View
1.0	31	144	3	22	35

State Variables

Version	Total	Public
1.0	40	19

Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	^0.6.0 ^0.6.2 0.6.12			yes (6 asm blocks)	

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	ECRecover	New/ Create/ Create2
1.0	yes			yes	yes	



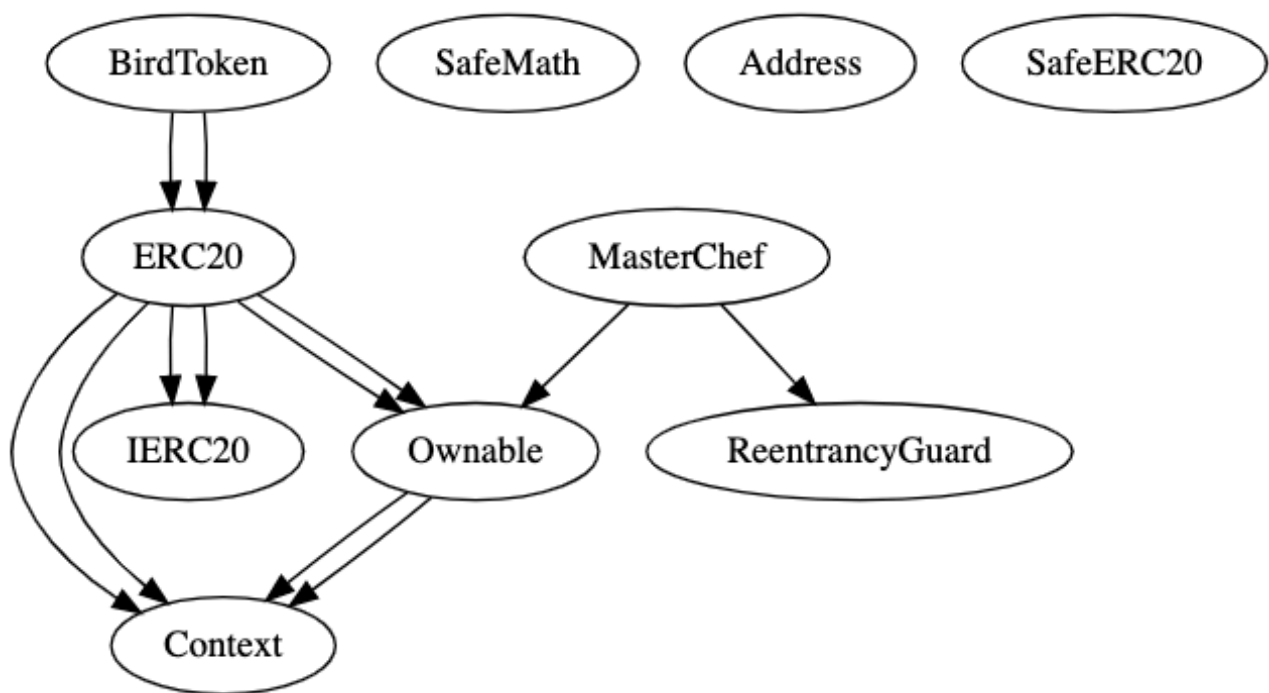
Scope of Work

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 v1.0



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	✓	✓	✓

Write functions of contract

BirdToken

1. approve →

2. decreaseAllowance →

3. delegate →

4. delegateBySig →

5. increaseAllowance →

6. mint →

7. mint →

8. renounceOwnership →

9. transfer →

10. transferFrom →

11. transferOwnership →

MasterChef

1. add →

2. deposit →

3. emergencyWithdraw →

4. massUpdatePools →

5. renounceOwnership →

6. set →

7. setDevAddress →

8. setFeeAddress →

9. transferOwnership →

10. updateEmissionRate →

11. updatePool →

12. updateStartBlock →

13. withdraw →

Deployer cannot mint any new tokens

Name	Exist	Tested	Verified	File
Deployer cannot mint	✓	✓	✓	Main
Comment	Line: -			

Max / Total Supply: -

Comments:

v1.0

- MasterChef is owner and can mint token
 - can only mint as long as MAXCAP is smaller than MAXCAPSUPPLY

Deployer cannot burn or lock user funds

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



Deployer cannot pause the contract

Name	Exist	Tested	Verified
Deployer cannot pause	—	—	—



Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓

Legend

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

OnlyOwner functions

BirdToken







- mint



[illegible]

Source Units in Scope

v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/birdtoken.sol	6	1	1054	958	380	541	260	
	contracts/MasterChef.sol	9	1	1429	1332	599	655	423	
	Totals	15	2	2483	2290	979	1196	683	

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	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	Main	A floating pragma is set		The current pragma Solidity directive is „^0.6.0“.

Informational issues

- no informational issues found -

Commented Code exist

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

Line	Comment
MasterChef, 1413	// function setVaultAddress(address _vaultAddress) external onlyOwner { // vaultAddress = _vaultAddress; // emit SetVaultAddress(msg.sender, _vaultAddress); //}

MasterChef, 1238	// event SetVaultAddress(address indexed user, address indexed newAddress);
MasterChef, 1246	// address _vaultAddress
MasterChef, 1253	// vaultAddress = _vaultAddress;
MasterChef, 1218	// address public vaultAddress;

Recommendation

Remove the commented code, or address them properly.

Audit Comments

25. November 2021:

- MasterChef is owner of Bird Token

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

The logo features the word "SolidProofed" in a white, elegant script font. 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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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