



SOLIDProof
Bring trust into your projects

Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

v1.0: 12. January, 2022

Audit

Security Assessment
12. January, 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
Scope of Work	13
Inheritance Graph	13
Verify Claims	14
Modifiers	20
CallGraph	21
Source Units in Scope	22
Critical issues	23
High issues	23
Medium issues	23
Low issues	23
Informational issues	23
Audit Comments	23
SWC Attacks	24

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Version	Date	Description
1.0	11. January 2022	<ul style="list-style-type: none">• Layout project• Automated- /Manual-Security Testing• Summary
1.0	12. January 2022	Reaudit

Network

Binance Smart Chain (BEP20)

Website

<https://www.bitcrush.com/>

Telegram

<https://t.me/Bcarcadechat>

Twitter

<https://twitter.com/bitcrusharcade>



Description

TBA

Project Engagement

During the 10th of January 2022, **Bitcrush Arcade 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

- Github
 - https://github.com/Bitcrush-Arcade/crush_contracts/blob/lotteryGasUpdate/contracts/CrushCoin.sol
 - Commit: ba8da5491c89ff9d719cac9ba178815a6d6aa77b

v1.1

- Github
 - https://github.com/Bitcrush-Arcade/crush_contracts/blob/lotteryGasUpdate/contracts/CrushCoin.sol
 - Commit: e6c8ee47a777ad8413a9aa075674c300d975e190

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:

Dependency / Import Path	Count
@chainlink/contracts/src/v0.8/VRFConsumerBase.sol	1
@openzeppelin/contracts/access/Ownable.sol	2
@openzeppelin/contracts/security/ReentrancyGuard.sol	1
@openzeppelin/contracts/token/ERC20/ERC20.sol	2
@openzeppelin/contracts/token/ERC20/utils/SafeERC20.sol	1
@openzeppelin/contracts/utils/math/SafeMath.sol	2



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

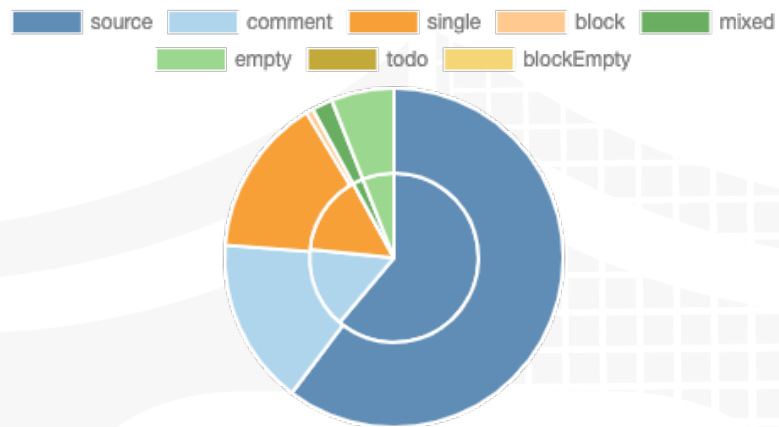
File Name	SHA-1 Hash
contracts/CrushCoin.sol	93e62111f12bb9cb4e5fe820a11d9974f70eb7da
contracts/Lottery.sol	dff9f4b6741eda25bd1bc6ecdfdad21e69f225aa

v1.1

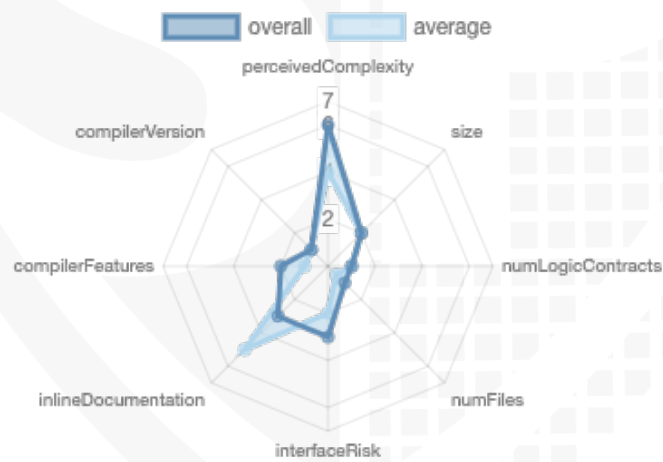
File Name	SHA-1 Hash
contracts/CrushCoin.sol	93e62111f12bb9cb4e5fe820a11d9974f70eb7da
contracts/Lottery.sol	a54e1988a6be5fce1311905ad4995f874066550

Metrics

Source Lines v1.0



Risk Level v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	2	0	1	0

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	26	0

Version	External	Internal	Private	Pure	View
1.0	21	45	0	8	8

State Variables

Version	Total	Public
1.0	49	36

Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	<code>>0.8.0</code>			yes (1 asm blocks)	yes

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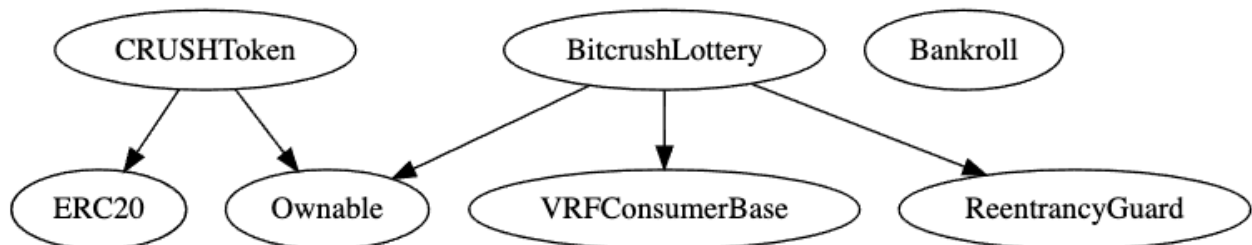
Scope of Work

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

▼ BITCRUSHLOTTERY

- addToPool
- buyTickets
- claimAllPendingTickets
- crushTheContract
- editPartner
- endRound
- exchangeForTicket
- firstStart
- rawFulfillRandomness
- renounceOwnership
- rewardTicket
- setBonusCoin
- setBurnThreshold
- setClaimerFee
- setDistributionPercentages
- setEndHours
- setTicketValue
- setWinner
- toggleOperator
- togglePauseStatus
- transferOwnership

▼ CRUSHTOKEN

- approve
- burn
- decreaseAllowance
- increaseAllowance
- mint
- renounceOwnership
- transfer
- transferFrom
- transferOwnership

Deployer cannot mint any new tokens

Name	Exist	Tested	Verified
Deployer cannot mint	✓	✓	✗

Max / Total Supply: 30.000.000

Comments:

v1.0

- Deployer can mint as long as minting amount + totalSupply is lower than max supply - burned token



Deployer cannot burn or lock user funds

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

Comments:

v1.0

- Deployer can burn token

Deployer cannot pause the contract

Name	Exist	Tested	Verified
Deployer cannot pause	✓	✓	✗

Comments:

v1.0

- Deployer can pause Lottery



Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓

Legend

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

Modifiers

- onlyOwner
 - Mint

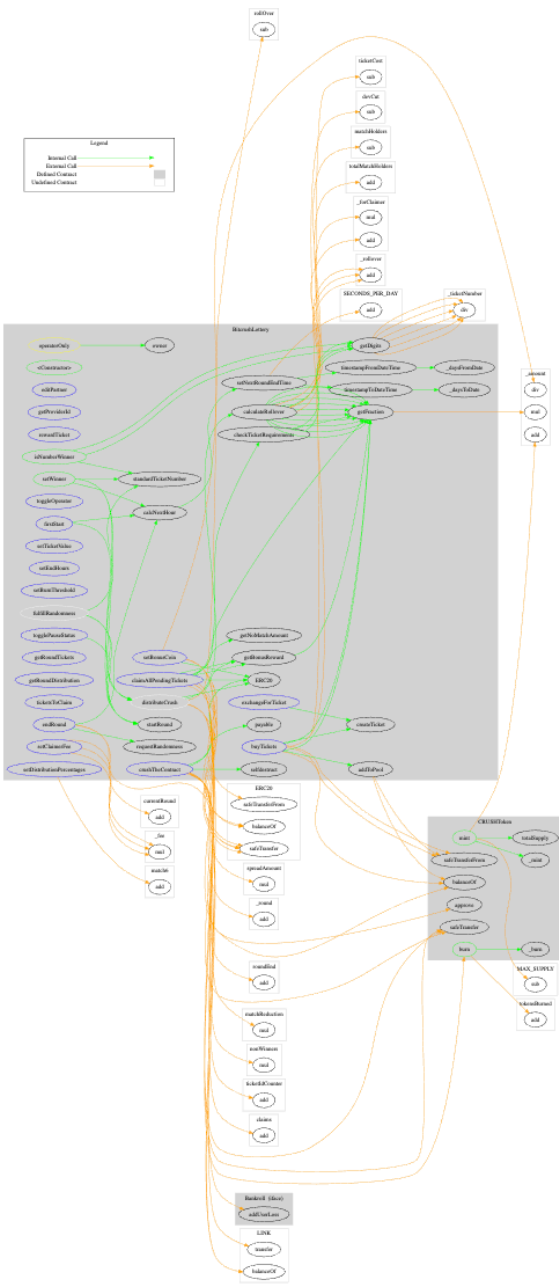
Lottery

◆ buyTickets	
⊗ nonReentrant	
◆ editPartner	
⊗ operatorOnly	
◆ rewardTicket	
⊗ operatorOnly	
◆ exchangeForTicket	
◆ firstStart	
⊗ operatorOnly	
◆ toggleOperator	
⊗ operatorOnly	
◆ setClaimerFee	
⊗ onlyOwner	
◆ setBonusCoin	
⊗ operatorOnly	
◆ setTicketValue	
⊗ onlyOwner	
◆ setEndHours	
⊗ operatorOnly	
◆ setBurnThreshold	
⊗ onlyOwner	
◆ togglePauseStatus	
⊗ onlyOwner	
◆ crushTheContract	
⊗ onlyOwner	
◆ setDistributionPercentages	
⊗ onlyOwner	
◆ setWinner	
⊗ operatorOnly	

Comments






- Deployer can set following state variables without any limitations
- Deployer can enable/disable following state variables
 - operators
 - Can be only set by owner or operator
 - pause
- Notice says that setWinner is a helpful function to test winners locally but it can be called by operatorOnly

CallGraph








Source Units in Scope

v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/CrushCoin.sol	1	————	30	30	19	4	19	————
	contracts/Lottery.sol	1	1	906	895	683	181	740	
	Totals	2	1	936	925	702	185	759	

v1.1

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/CrushCoin.sol	1	————	30	30	19	4	19	————
	contracts/Lottery.sol	1	1	914	903	669	205	729	
	Totals	2	1	944	933	688	209	748	

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

No low issues

Informational issues

No medium issues

Audit Comments

11. January 2022:

- Onlyowner can add and remove new operators
- There is a selfdestruct call in the crushTheContract function
- Read whole report for more information

12. January 2022:

- Issues in Audit Results section were fixed

SWC Attacks

ID	Title	Relationships	Status
SW C-1 36	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
SW C-1 35	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
SW C-1 34	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
SW C-1 33	Hash Collisions With Multiple Variable Length Arguments	CWE-294: Authentication Bypass by Capture-replay	PASSED
SW C-1 32	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
SW C-1 31	Presence of unused variables	CWE-1164: Irrelevant Code	PASSED
SW C-1 30	Right-To-Left-Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
SW C-1 29	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
SW C-1 28	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SW C-1 27	Arbitrary Jump with Function Type Variable	CWE-695: Use of Low-Level Functionality	PASSED
SW C-1 25	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
SW C-1 24	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
SW C-1 23	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
SW C-1 22	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
SW C-1 21	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
SW C-1 20	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-11 1	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-1 09	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
SW C-1 08	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED
SW C-1 07	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SW C-1 06	Unprotected SELFDESTRUCT Instruction	CWE-284: Improper Access Control	PASSED

SW C-1 05	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
SW C-1 04	Unchecked Call Return Value	CWE-252: Unchecked Return Value	PASSED
SW C-1 03	Floating Pragma	CWE-664: Improper Control of a Resource Through its Lifetime	PASSED
SW C-1 02	Outdated Compiler Version	CWE-937: Using Components with Known Vulnerabilities	PASSED
SW C-1 01	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
SW C-1 00	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED

The logo features the word "SolidProofed" in a white, cursive script font. The text is set against a dark blue background that includes a faint, stylized shield emblem. The shield has a grid-like pattern and a blue-to-white gradient. The word "Solid" is positioned above "Proofed", and the "P" in "Proofed" is large and loops around the "S" in "Solid".

SolidProofed

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A small horizontal bar representing the German flag, with black, red, and gold stripes.

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