SOLIDProof
Bring trust into your projects

Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

Sacred Realm

Audit

Security Assessment
14. July, 2022

For

SACRED REALM

SolidProof_io

@solidproof_io

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

Network
Binance Smart Chain (BEP20)

Website
https://sealemlab.com/#/home

Telegram
https://t.me/SealemCommunity

Twitter
https://twitter.com/SealemLab

Medium
https://medium.com/@sealemlab

Discord
https://discord.gg/s747pMMBzq

Description

The Sealem platform creates a new generation of DeFi + Gamefi protocol. Participating in governance by buying bonds to obtain ST token, and at the same time obtaining game tokens by staking, and enjoying a variety of high-quality games on the platform.The DeFi + Gamefi model reduces the risk of unlimited inflation, and the two parts will interoperate to maximize returns.

Project Engagement

During the 12th of July 2022, **SealemLab 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

SACRED REALM

Contract Link

v1.0

- SN
  - https://bscscan.com/address/0xce4c314f5baedea571c60cf1d09ecf4304fecf6a#code
- SB
  - https://bscscan.com/address/0xA8De106949D494E2b346E4496695Abe71C4b02eC#code

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:

IERC20
Address
SafeERC20
IERC165
IERC721
IERC721Receiver
IERC721Metadata
Context
Strings
ERC165
ERC721
IERC721Enumerable
ERC721Enumerable
IAccessControl
IAccessControlEnumerable
AccessControl
EnumerableSet
AccessControlEnumerable
ReentrancyGuard
LinkTokenInterface
VRFCoordinatorV2Interface
VRFConsumerBaseV2
IInviting
ISN

IERC165
IERC721
IERC721Receiver
IERC721Metadata
Address
Context
Strings
ERC165
ERC721
IERC721Enumerable
ERC721Enumerable
IAccessControl
IAccessControlEnumerable
AccessControl
EnumerableSet
AccessControlEnumerable

Tested Contract Files

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

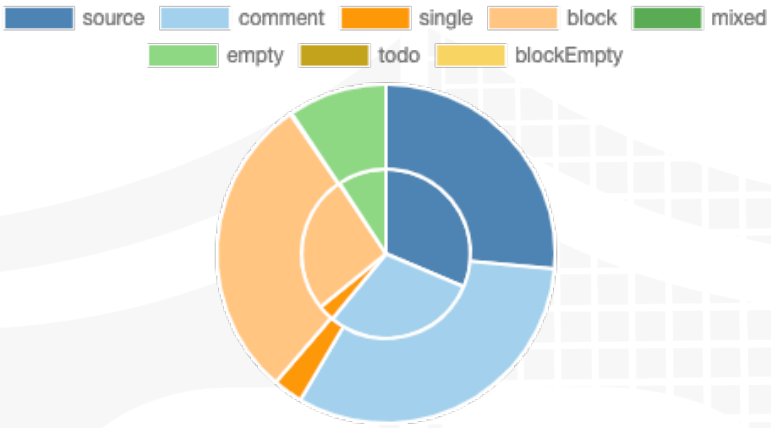
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

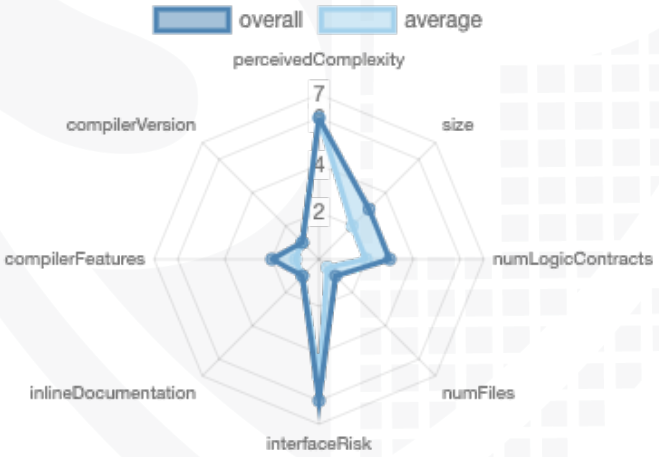
File Name	SHA-1 Hash
contracts/SN.sol	3ea62d330d97969802085a4813c5824e50b2771e
contracts/SB.sol	a4272aeb6a01e01ff5dc7f1082a980b909c745ca

Metrics

Source Lines
v1.0



Risk Level
v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	4	7	17	14

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	167	1

Version	External	Internal	Private	Pure	View
1.0	106	277	23	11	141

State Variables

Version	Total	Public
1.0	70	39

Capabilities

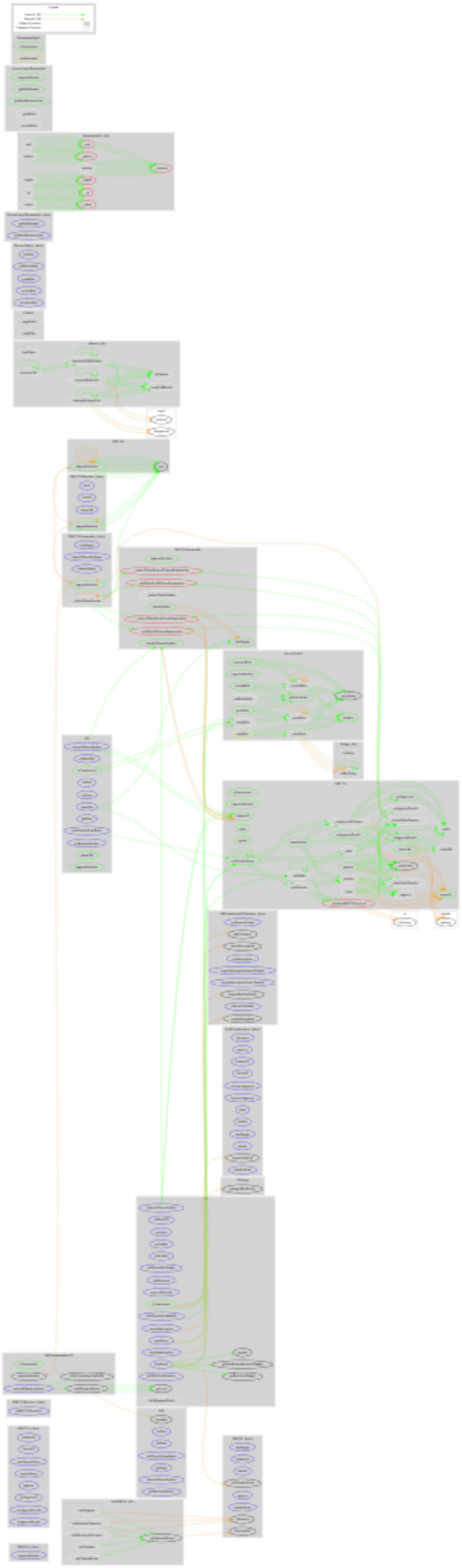
Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	`^0.8.0` `^0.8.1` `>=0.8.12`		`yes`	`yes` (8 asm blocks)	

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

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. Is contract an upgradeable
2. Overall checkup (Smart Contract Security)

Is contract an upgradeable

Name	
Is contract an upgradeable?	No

Write functions of contract v1.0

SN

- approve
- grantRole
- renounceRole
- revokeRole
- safeTransferFr...
- safeTransferFr...
- safeTransferFr...
- setApprovalFo...
- setBaseURI
- setData
- setDatas
- spawnSn
- transferFrom

SB

- addBoxesMax...
- addWhiteList
- approve
- buyBoxes
- cancelSubscrip...
- grantRole
- openBoxes
- rawFulfillRand...
- removeWhiteL...
- renounceRole
- revokeRole
- safeTransferFr...
- safeTransferFr...
- safeTransferFr...
- setAddrs
- setApprovalFo...
- setBaseURI
- setBoxInfo
- setVrfInfo
- topUpSubscrip...
- transferFrom

Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓

Legend

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

Modifiers and public functions
v1.0

SB

- setBaseURI
  - onlyRole
- setAddrs
  - onlyRole
- setVrfInfo
  - onlyRole
- setBoxInfo
  - onlyRole
- addBoxesMaxSupply
  - onlyRole
- addWhiteList
  - onlyRole
- removeWhiteList
  - onlyRole
- topUpSubscription
  - onlyRole
- cancelSubscription
  - onlyRole
- buyBoxes 💰
  - nonReentrant
- openBoxes
  - nonReentrant
- safeTransferFromBatch
- rawFulfillRandomWords

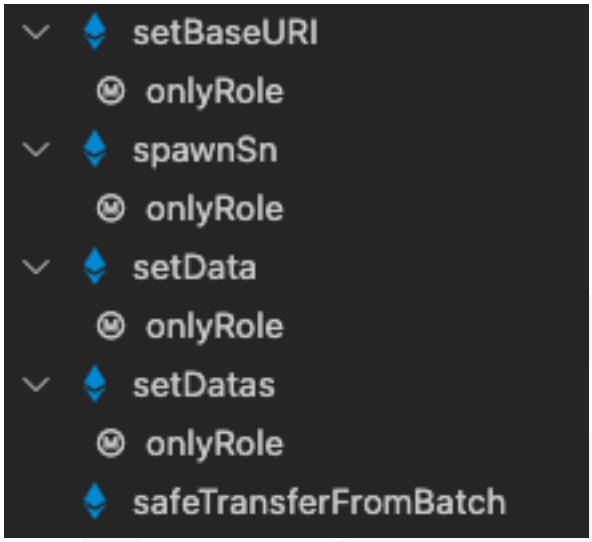
ISN

- spawnSn
- setData
- setDatas
- safeTransferFromBatch

Inviting

- managerBindInviter

SN



Comments

- *Deployer can set following state variables without any limitations*
  - SB
    - callbackGasLimit
      - Max 2^32 - 1
    - requestConfirmations
      - Max 2^16 - 1
    - boxTokenPrices
    - hourlyBuyLimits
    - starsProbabilities
    - powerProbabilities
    - partProbabilities
    - boxesMaxSupply
  - SN
    - data[snId][slot]
    - datas[newSnId]["attr"]

- *Deployer can enable/disable following state variables*
  - SB
    - whiteListFlags

- *Deployer can set following addresses*
  - SB
    - baseURI
    - sn
    - inviting
    - keyHash
    - tokenAddrs
    - receivingAddrs

        - whiteList
    - SN
        - baseURI

- *Existing Modifiers*
    - onlyRole
    - nonReentrant

- There are several authorities which are authorized to call some functions, that means, if the owner is renounced, another address is still authorized to call functions
    - Be aware of this

- Manager is able to add modify boxes max supply but not able to subtract
- Make sure to check the starsProbabilities length of 11 while setting box info otherwise nobody is able to buy
- Manager is able to set boxes without any limitations

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/SN.sol	10	7	2216	1856	772	1093	547	
	contracts/SB.sol	15	10	3180	2436	1150	1455	835	
	Totals	**25**	**17**	**5396**	**4292**	**1922**	**2548**	**1382**	

Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalised lines of the source unit (e.g. normalises functions spanning multiple lines)
nSLOC	normalised 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	All	A floating pragma is set	Top of files	Use specific pragma version
#3	SB	State variables shadowing	2683	Rename the state variables that shadow another component

Informational issues

Issue	File	Type	Line	Description
#1	SB	State variables that could be declared constant (constable-states)	2687, 2683	Add the `constant` attributes to state variables that never change

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.

14. July 2022:

- Inviting contract was not provided to Solidproof. Please DYOR here.
- Read whole report and modifiers section 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	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	NOT 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

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