

Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

Audit

Security Assessment 13. December, 2021

For



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Disclaimer

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Version	Date	Description
1.0	13. December 2021	Layout projectAutomated- /Manual-Security TestingSummary

Network

Binance Smart Chain (BEP20)

Website

https://baksdao.com/

Telegram

https://t.me/BaksDAO_INT_COMMUNITY

Twitter

https://twitter.com/BaksDAO

Facebook

https://www.facebook.com/BaksDAOint/

Medium

https://medium.com/@BaksDAO

Github

https://github.com/BaksDAO/contracts-mirror/tree/master/contracts

Description

A platform to get more from your crypto assets

Project Engagement

During the 7th of December 2021, **BaksDAO 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.



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	
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.

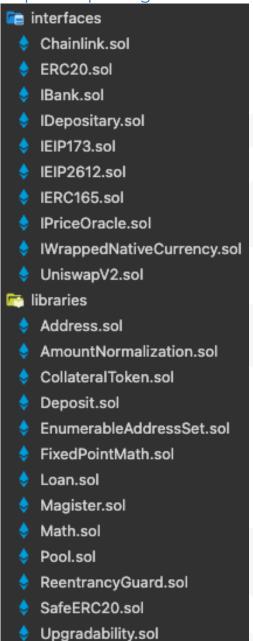
Methodology

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-byline 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.

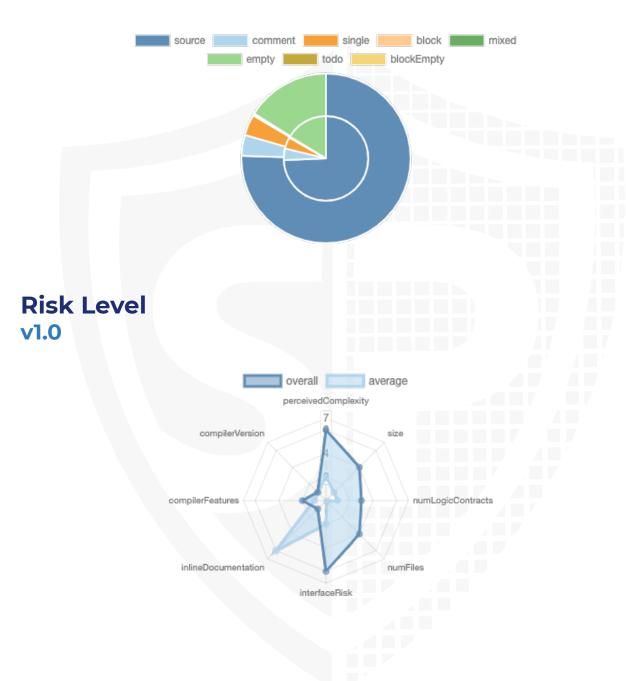
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

File Name	SHA-1 Hash
contracts/Bank.sol	119f8c95cfa5f2223e1a3095b2b26f983766c953
contracts/Core.sol	0888859f05b26d317c9089d969c1255456c33364
contracts/Voice.sol	c3505175b48d6500501a38cff4c33c37a92f622a
contracts/DevelopmentFund.sol	22b8a55f5d6acc42060e39d56ca1f093055f8b0f
contracts/ExchangeFund.sol	a0b70c7c28e582fd38c35b135ba39e44f55213be
contracts/Baks.sol	c854695fcbb334ed778d875c75d3eab84a336109
contracts/BaseToken.sol	79def02ed6512525877953e116c6fc9c47fe4535
contracts/ChainlinkPriceOracle.sol	91277f57ed3cfe0089e5243f1e910c5ada28cd0e
contracts/Depositary.sol	58550293d1389c074e056f573a07dc1706ffb66b
contracts/Governance.sol	b71e75981d752afdc3262afe4114e3fada84857a
contracts/libraries/ReentrancyGuard.sol	918902edcfb99b9e5966853f94cc84d6a522aa1c
contracts/interfaces/Chainlink.sol	c247bda0380df398860201f6225360a324f58b7a
contracts/libraries/Deposit.sol	a77d79889a7bd6294d3a8d041a0f645082eff996
contracts/interfaces/IERC165.sol	754045c4544e2677fbff8e619bbb6dd4f4ab0348
contracts/interfaces/IEIP173.sol	d23be034f71cb447a9b3eb17ffedaa19013d3cb7
contracts/interfaces/UniswapV2.sol	3db416095fd0b486de1d2565b66aab2b6c42c0f4
contracts/interfaces/IEIP2612.sol	762590cf872ae51c556f209730a6b9fda2adf921
contracts/interfaces/IDepositary.sol	1cb698001233d270b0490ae4fb2437546aa6fa40
contracts/interfaces/IPriceOracle.sol	cfe142174736a6e7a604c186920da9d916c9be8a
contracts/interfaces/IWrappedNativeCurrency.sol	c71ea61b95dcf0214b504694e9029cf33ea4775d
contracts/interfaces/ERC20.sol	0aa9e66531b96d6245394c4925f02e33664001ca
contracts/interfaces/IBank.sol	74d5f67ea83b9cf63b4e233a5e2eb4e459405bb7
contracts/libraries/Address.sol	e0e6c3de29932c0810e3f502c77ad1b74edb8fed
contracts/libraries/Math.sol	1429c90bdcf252a89a6d4711b6f8d64f850473cc
contracts/libraries/AmountNormalization.sol	854bc4cf8e570c17a653e70aa0474c83a0898efc
contracts/libraries/Magister.sol	c92f545770adc6424e0ae1bd24c9fe236f523d57
contracts/libraries/SafeERC20.sol	4be13e0ddde00aa02bd56151e98d553c32ee870
contracts/libraries/FixedPointMath.sol	18b008a953b045adb2a6eee6e7c778a3dba1238
contracts/libraries/Upgradability.sol	a10acb5cc5fba62ff2d7e4f9b6856ee16017553d
contracts/libraries/Pool.sol	ca2565ecfdf7626679b15a3c51f7b61443cbd62f
contracts/libraries/EnumerableAddressSet.sol	bff81588fe35273f05bb7998a3a9b2adfb6d8a5b
contracts/libraries/CollateralToken.sol	ce741e9a579a477d37ec282206007a575cddc99
contracts/libraries/Loan.sol	be551d43ee22b3093f35fef2c41fa0b8bc400c53

Metrics

Source Lines v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	10	12	14	5

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	153	6

Version	External	Internal	Private	Pure	View
1.0	142	166	0	19	86

State Variables

Version	Total	Public
1.0	85	53

Capabilities

Version	Solidity Versions observed	Experim ental Features	Can Receive Funds	Uses Assembl Y	Has Destroya ble Contract s
1.0	0.8.10		yes	yes (13 asm blocks)	

Version	Transf ers ETH	Low- Level Calls	Delega teCall	Uses Hash Functi ons	ECRec over	New/ Create/ Create 2
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yes yes yes



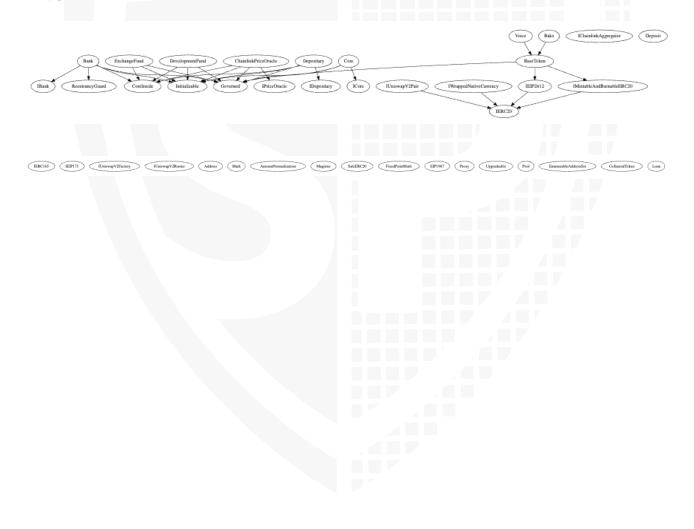
Scope of Work

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		Tested	Verified
TotalSupply	provides information about the total token supply	\checkmark	√	✓
BalanceOf	provides account balance of the owner's account	\checkmark	√	\checkmark
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	√	1	✓

Write functions of contract





Deployer cannot mint any new tokens

File	Name	Exist	Tested	Verified
Baks	cannot mint	\checkmark	✓	X
Voice	cannot mint	√	√	X

Max / Total Supply:

Comments:

v1.0

- Baks
 - · onlyMinter can mint
- Voice
 - · onlyMinter can mint

Deployer cannot burn or lock user funds

File	Name	Exist	Teste d	Verified
Baks	cannot lock	\checkmark	✓	\checkmark
	cannot burn	√	√	X
Voice	cannot lock	√	√	✓
	cannot burn	√	√	X

Deployer cannot pause the contract

File	Name	Exist	Teste d	Verifie d
All	cannot pause	-	-	-



Overall checkup (Smart Contract Security)

Tested	Verified
\checkmark	\checkmark

Legend

Attribute	Symbol
Verfified / Checked	\checkmark
Partly Verified	
Unverified / Not checked	X
Not available	-

Modifiers

Baks/Voice

- onlyMinter
 - Mint
 - Burn
- onlyGovernor
 - setMinter

Bank

- initialize
- borrow
- borrowInNativeCurrency 👸
- deposit
- depositlnNativeCurrency
- nonReentrant

- 🔷 repay
- nonReentrant

- liquidate
- onSubjectToLiquidation

- onNewDeposit
- listCollateralToken
- ⊗ onlyGovernor
- unlistCollateralToken
- setInitialLoanToValueRatio
- ⊗ onlyGovernor
- salvage
- ⊗ onlyGovernor

ChainlinkPriceOracle

- initialize
- initializer
- setAggregator
- ❷ onlyGovernor

Core

- initialize
- onlyGovernor
 - setPriceOracle
 - setBaks
 - setVoice
 - setBank
 - setDepositary
 - setExchangeFund
 - setDevelopmentFund
 - setOperator
 - setLiquidator
 - setInterest
 - setMinimumPrincipalAmount
 - setStabilityFee
 - setPlatformFees
 - setMarginCallLoanToValueRatio
 - setLiquidationLoanToValueRatio
 - setRebalancingThreshold
 - setMinimumMagisterDepositAmount
 - 🔷 setWorkFee
 - setEarlyWithdrawalPeriod
 - setEarlyWithdrawalFee
 - setServicingThreshold
 - 🔷 setMinimumLiquidity

Depositary

- initialize
- whitelistMagister
 - ⊗ onlyGovernor
- blacklistMagister
- addPool
- ❷ onlyGovernor
- updatePool

DevelopmentFund

- · Initialize
 - Initializer

ExchangeFund

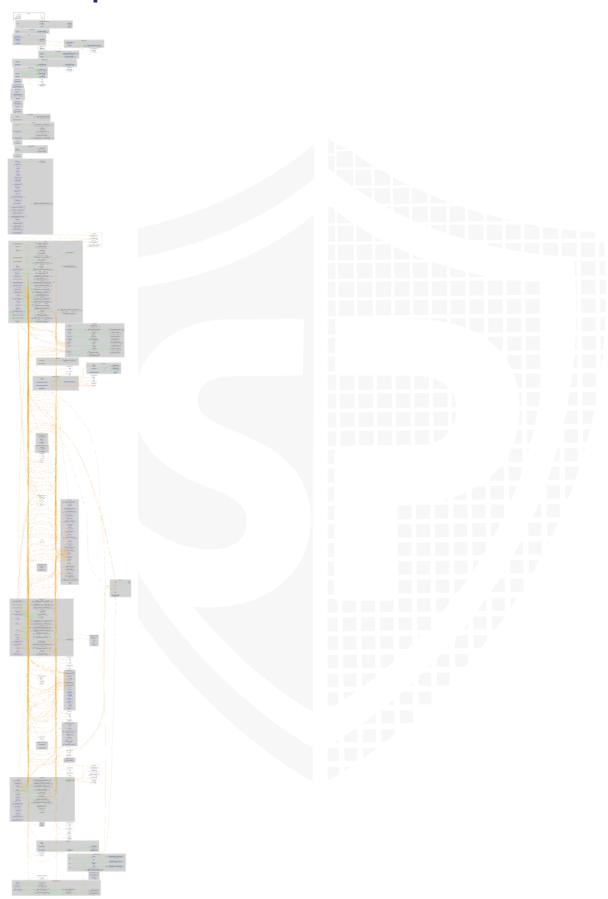
- Initialize
 - Initializer
 - deposit
 - ⊗ tokenAllowedToBeDeposited
 - swap
 - ★ tokenAllowedToBeSwapped
 - listDepositableToken
 - ❷ onlyGovernor
 - unlistDepositableToken
 - ⊗ onlyGovernor
 - setSlippageTolerance
 - ⊗ onlyGovernor
 - setSwapDeadline
 - ❷ onlyGovernor
 - 🔷 salvage
 - ⊗ onlyGovernor
 - service

Governance

- transitGovernance
 - onlyGovernor



CallGraph



Source Units in Scope

v1.0

Туре	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
2	contracts/Bank.sol	1		605	555	400	50	342	. <u>Š</u>
) Q	contracts/Core.sol	2	1	325	263	204	22	187	
9	contracts/Voice.sol	1		8	8	5	1	4	
9	contracts/DevelopmentFund.sol	1		13	13	10	1	12	
9	contracts/ExchangeFund.sol	1		402	397	294	23	319	
9	contracts/Baks.sol	1		8	8	5	1	4	
ý.	contracts/BaseToken.sol	1		226	206	162	2	103	ΞΕΣ
ý	contracts/ChainlinkPriceOracle.sol	1		88	84	66	1	54	
9	contracts/Depositary.sol	1		422	387	323	2	225	<u>&</u>
©	contracts/Governance.sol	1		52	52	42	1	23	
%	contracts/libraries/ReentrancyGuard.sol	1		27	27	18	1	6	
Q	contracts/interfaces/Chainlink.sol		1	17	5	3	1	5	
\begin{align*} \begin{align*} \text{**} \text{**}	contracts/libraries/Deposit.sol	1		27	27	23	1	1	
Q	contracts/interfaces/IERC165.sol		1	6	5	3	1	3	*
Q	contracts/interfaces/IEIP173.sol		1	10	7	4	1	5	
Q	contracts/interfaces/UniswapV2.sol		3	80	9	6	1	29	
Q	contracts/interfaces/IEIP2612.sol		1	21	7	4	2	9	
Q	contracts/interfaces/IDepositary.sol		1	6	5	3	1	3	
Q	contracts/interfaces/IPriceOracle.sol		1	24	23	8	12	3	
Q	contracts/interfaces/IWrappedNativeCurrency.sol		1	10	7	4	1	10	. <u>&</u> .
Q	contracts/interfaces/ERC20.sol		2	35	9	6	1	26	
Q	contracts/interfaces/IBank.sol		1	8	7	4	1	3	
\(\rightarrow\)	contracts/libraries/Address.sol	1		60	48	39	1	34	20
\(\rightarrow\)	contracts/libraries/Math.sol	1		100	100	90	2	26	
\begin{align*}	contracts/libraries/AmountNormalization.sol	1		28	24	19	1	6	
\begin{align*}	contracts/libraries/Magister.sol	1		18	18	14	1	1	
\begin{align*} \begin{align*} \begi	contracts/libraries/SafeERC20.sol	1		39	29	21	1	11	
\(\rightarrow\)	contracts/libraries/FixedPointMath.sol	1		374	370	333	6	286	Σ
∌ €	contracts/libraries/Upgradability.sol	4		113	113	86	1	89	<u></u>
\begin{align*} 	contracts/libraries/Pool.sol	1		62	58	47	1	15	
\(\rightarrow\)	contracts/libraries/EnumerableAddressSet.sol	1		51	51	40	1	10	
\(\rightarrow\)	contracts/libraries/CollateralToken.sol	1		129	102	86	1	33	
<u></u>	contracts/libraries/Loan.sol	1		55	55	45	1	15	
> ≧Q %	Totals	27	14	3449	3079	2417	145	1902	

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

	a custom complexity score derived from code statements that
Complexity Score	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	Туре	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	Core	Missing Zero Address Validation (missing- zero-check)	150, 149, 148, 147, 184, 194, 199, 209, 204, 219, 214, 179, 189	Check that the address is not zero
#3	Baks	Local variables shadowing	7	Rename the local variables that shadow another component

Informational issues

Issue	File	Type	Line	Description
#1	Exchan geFund	Unused return values	74, 73, 77, 76	Ensure that all the return values of the function calls are used and handle both success and failure cases if needed by the business logic

#2	FixedPo intMath	Functions that are not used	124	Remove unused functions
#3	Math	Functions that are not used	9	Remove unused functions
#4	Bank	Unused state variables	112	Remove unused state variables
#5	Exchan geFund	Unused state variables	23, 22	Remove unused state variables

Audit Comments

13. December 2021:

· Read whole report for more information

SWC Attacks

ID	Title	Relationships	Status
<u>SW</u> <u>C-1</u> <u>36</u>	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
<u>SW</u> <u>C-1</u> <u>35</u>	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
<u>SW</u> <u>C-1</u> <u>34</u>	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
<u>SW</u> <u>C-1</u> <u>33</u>	Hash Collisions With Multiple Variable Length	CWE-294: Authentication Bypass by Capture-replay	PASSED
<u>SW</u> <u>C-1</u> <u>32</u>	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
<u>SW</u> <u>C-1</u> <u>31</u>	Presence of unused variables	CWE-1164: Irrelevant Code	NOT PASSED
<u>SW</u> <u>C-1</u> <u>30</u>	Right-To-Left- Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
<u>SW</u> <u>C-1</u> <u>29</u>	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
<u>SW</u> <u>C-1</u> <u>28</u>	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SW C-1 27	Arbitrary Jump with Function Type	CWE-695: Use of Low-Level Functionality	PASSED
<u>SW</u> <u>C-1</u> <u>25</u>	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
<u>SW</u> <u>C-1</u> <u>24</u>	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
<u>SW</u> <u>C-1</u> <u>23</u>	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
<u>SW</u> <u>C-1</u> <u>22</u>	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
<u>SW</u> <u>C-1</u> <u>21</u>	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
<u>SW</u> <u>C-1</u> <u>20</u>	Weak Sources of Randomness from Chain	CWE-330: Use of Insufficiently Random Values	PASSED
<u>SW</u> <u>C-11</u> <u>9</u>	Shadowing State Variables	CWE-710: Improper Adherence to Coding Standards	NOT PASSED
<u>SW</u> <u>C-11</u> <u>8</u>	Incorrect Constructor Name	CWE-665: Improper Initialization	PASSED
<u>SW</u> <u>C-11</u> <u>7</u>	Signature Malleability	CWE-347: Improper Verification of Cryptographic Signature	PASSED

<u>SW</u> <u>C-11</u> <u>6</u>	Timestamp Dependence	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
<u>SW</u> <u>C-11</u> <u>5</u>	Authorization through tx.origin	CWE-477: Use of Obsolete Function	PASSED
<u>SW</u> <u>C-11</u> <u>4</u>	Transaction Order Dependence	CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')	PASSED
<u>SW</u> <u>C-11</u> <u>3</u>	DoS with Failed Call	CWE-703: Improper Check or Handling of Exceptional Conditions	PASSED
<u>SW</u> <u>C-11</u> <u>2</u>	Delegatecall to Untrusted Callee	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
<u>SW</u> <u>C-11</u> <u>1</u>	Use of Deprecated Solidity Functions	CWE-477: Use of Obsolete Function	PASSED
<u>SW</u> <u>C-11</u> <u>O</u>	Assert Violation	CWE-670: Always-Incorrect Control Flow Implementation	PASSED
<u>SW</u> <u>C-1</u> <u>09</u>	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
<u>SW</u> <u>C-1</u> <u>08</u>	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED
<u>SW</u> <u>C-1</u> <u>07</u>	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SW C-1 06	Unprotected SELFDESTRUC T Instruction	CWE-284: Improper Access Control	PASSED

SW C-1 05	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
<u>SW</u> <u>C-1</u> <u>04</u>	Unchecked Call Return Value	CWE-252: Unchecked Return Value	NOT 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
<u>SW</u> <u>C-1</u> <u>01</u>	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
<u>SW</u> <u>C-1</u> <u>00</u>	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED



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