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**Blockchain Security | Smart Contract Audits | KYC**

MADE IN GERMANY

**RealTo Apps**

**Audit**

**Security Assessment**

**30. April, 2022**

**For**



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# Disclaimer

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Version	Date	Description
1.0	21. April 2022	<ul style="list-style-type: none"><li>• Layout project</li><li>• Automated- /Manual-Security Testing</li><li>• Summary</li></ul>
1.1	30. April 2022	<ul style="list-style-type: none"><li>• Reaudit</li><li>• Added alleviation from the team</li><li>• Finalised report</li></ul>

## **Network**

Polygon MATIC

## **Website**

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

## **Telegram**

<https://twitter.com/RealtoApps>

## **LinkedIn**

<https://www.linkedin.com/company/realtoapps>



## Description

Blockchain and AI-based Property & FinTech SaaS Platform for Real Estate & Alt Investment Sectors

## Project Engagement

During the 18th of April 2022, **RealToApps 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/realto-estate/contracts>
  - Commit: 3e22007adb63182f1f06bec1e1528c123c2d50bf

### v1.1

- Github
  - <https://github.com/realto-estate/contracts>
  - Commit: c23a4995c3e69bb84896bd33ed67ae24a636c41a

# 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)
<b>Critical</b>	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.
<b>High</b>	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.
<b>Medium</b>	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.
<b>Low</b>	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.
<b>Informational</b>	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
@openzeppelin/contracts/access/AccessControl.sol	2
@openzeppelin/contracts/access/Ownable.sol	2
@openzeppelin/contracts/security/ReentrancyGuard.sol	1
@openzeppelin/contracts/token/ERC20/IERC20.sol	1
@openzeppelin/contracts/token/ERC20/extensions/ERC20Pausable.sol	1
@openzeppelin/contracts/token/ERC20/extensions/ERC20Snapshot.sol	2
@openzeppelin/contracts/token/ERC20/utils/SafeERC20.sol	1
@openzeppelin/contracts/utils/math/SafeMath.sol	1



## Tested Contract Files

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

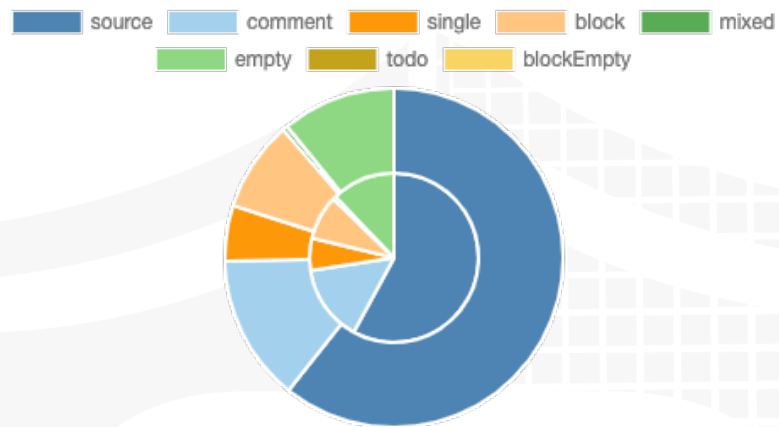
*A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.*

### v1.0

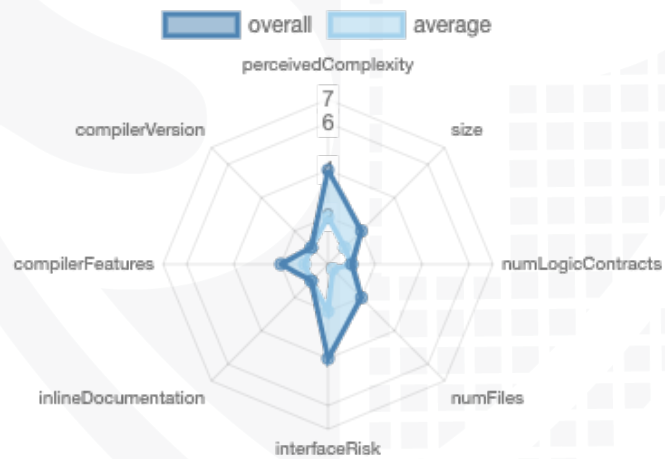
File Name	SHA-1 Hash
contracts/ISnapshotVault.sol	fc97e716de95cef09ee42520d3730f252061330d
contracts/IERC20Snapshot.sol	643e1ad2f4971760af87fe24985d67cc3cfa7602
contracts/Marketplace.sol	c8508810ff094363cafcee6846c83da2edd79b6e
contracts/DividendVault.sol	91b627bac05d876482c97e375e7239fa33567f1c
contracts/DealToken.sol	ce7d7dd6fd19716036a933071985e0d270ca65df
contracts/chainlink/AggregatorV3Interface.sol	881eeffc04f693216be6377ce4996d4900079b0c
contracts/Issuer.sol	95e34b999375e43485530b4556878b2f240c325c

# Metrics

## Source Lines v1.0



## Risk Level v1.0



## Capabilities

### Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	4	0	3	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	46	1

Version	External	Internal	Private	Pure	View
1.0	39	39	0	0	17

### State Variables

Version	Total	Public
1.0	36	18

### Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	$\geq 0.7.0$ $< 0.9.0$ $\wedge 0.8.0$		yes		

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	EC Recover	New/Create/Create2
1.0	yes			yes		yes → NewContract:DealToken → NewContract:DividendVault

## Inheritance Graph 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. 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)

### Correct implementation of Token standard

ERC20				
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 v1.0

```
changeAggregatorFeed  
changeErcPaymentAddress  
setTokenPrice  
setCommission  
allowTransfer  
disallowTransfer  
mint  
burn  
freezeAddress  
freezeTokens  
unfreezeTokens  
transfer  
transferFrom  
forceTransfer  
buy 💰  
buyWithStablecoin  
snapshot  
pause  
unpause
```

```
changeAggregatorInterface  
changeErcPaymentAddress  
addToWhitelist  
addToBlacklist  
create
```

```
snapshot  
withdraw
```

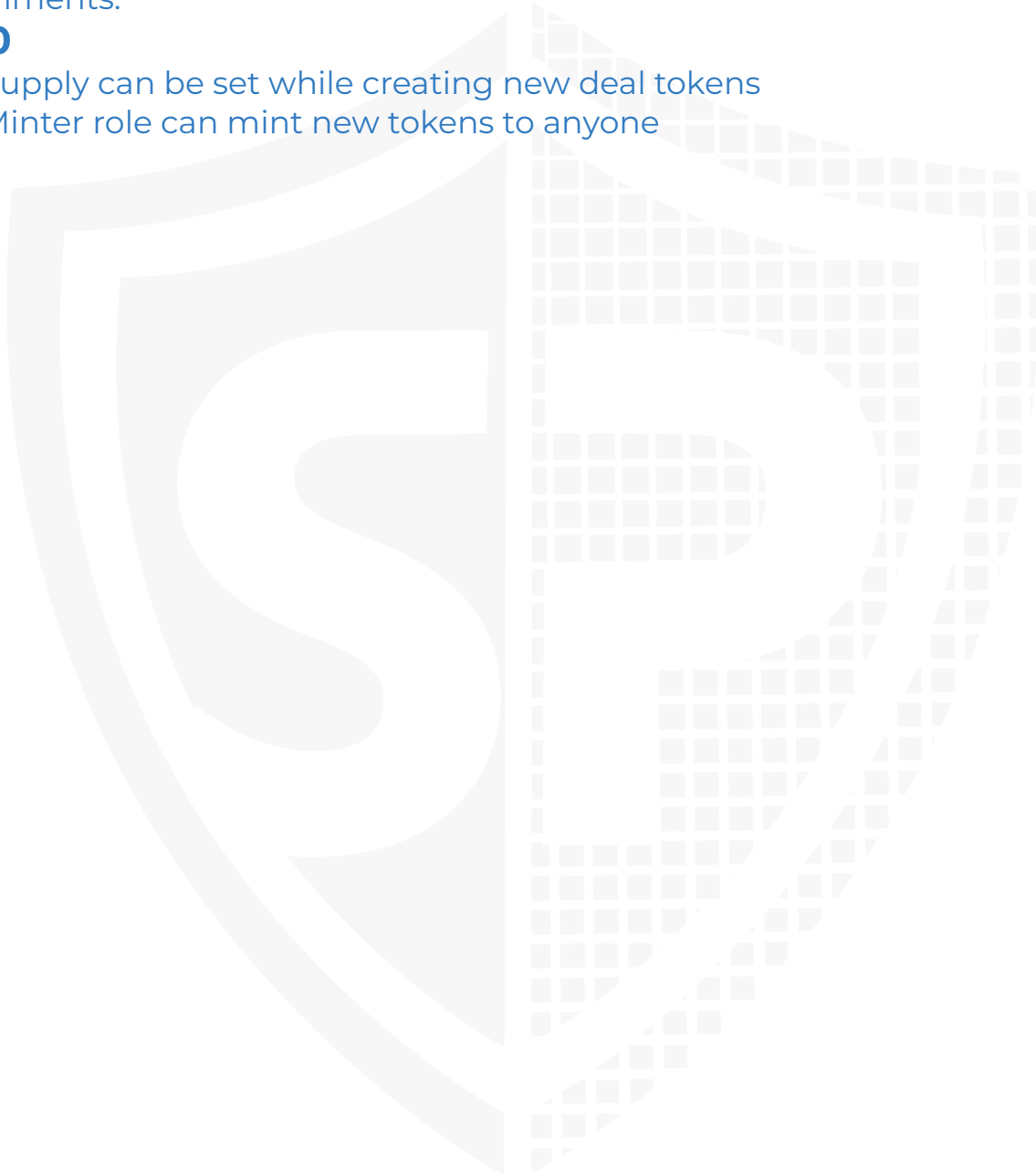
## Deployer cannot mint any new tokens

Name	Exist	Tested	Status
Deployer cannot mint	✓	✓	✗

Comments:

### v1.0

- Supply can be set while creating new deal tokens
- Minter role can mint new tokens to anyone





## Deployer cannot burn or lock user funds

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

Comments:

### v1.0

- Burner role can burn from any address without permission
- Owner can lock user funds by
  - allowing transfers
  - Locking addresses
  - Locking tokens
- Owner can add addresses to blacklist

## Deployer cannot pause the contract

Name	Exist	Tested	Status
Deployer cannot pause	✓	✓	✗

Comments:

**v1.0**

- Owner can pause contract



## Overall checkup (Smart Contract Security)

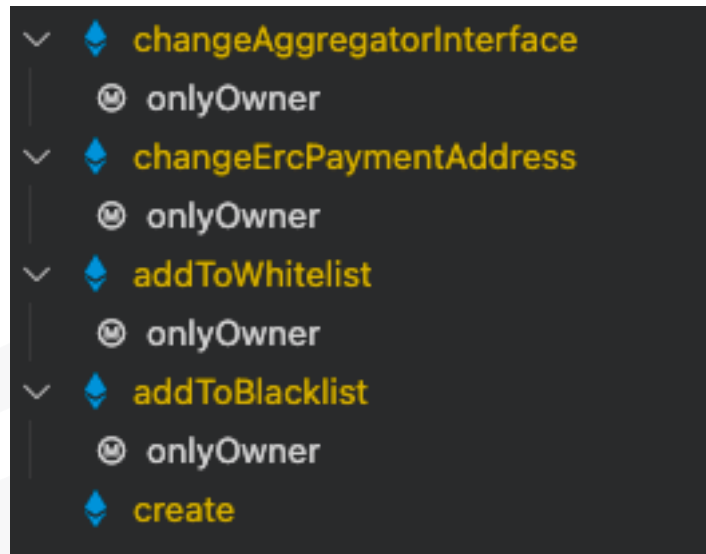
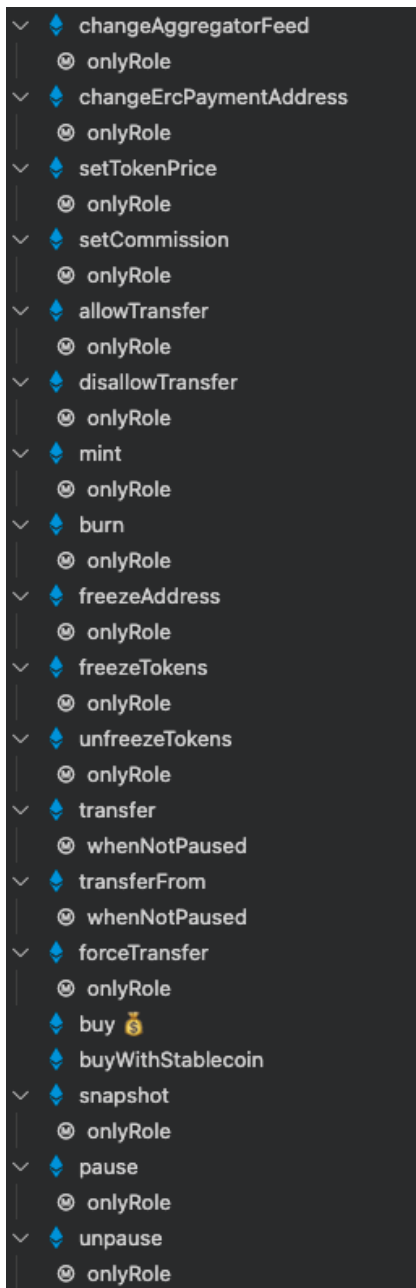
Tested	Verified
✓	✓

### Legend

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

# Modifiers and public functions

## v1.0



Note: Not listed functions are functions which are implemented from libraries

## Comments
















- Deployer can set following state variables without any limitations
  - lockTokens
  - allowTransfers
  - commission
  - tokenPrice
  - fees
  - finalTokenPrice

- Deployer can enable/disable following state variables
  - whiteListUsers
  - blackListUsers
  - \_paused
  - lockAddress
- Deployer can set following addresses
  - Erc20PaymentAddress
  - AggregatorInterface
  - \_token
  - \_priceFeed
- Blacklisted addresses cannot create new deal tokens
- Everyone except blacklisted address can create new tokens and dividendVaultAddress
- Only default admin role can call forceTransfer function and approve + transfer tokens from other addresses

**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/ISnapshotVault.sol	————	1	38	12	3	22	13	————
	contracts/IERC20Snapshot.sol	————	1	9	8	3	4	3	————
	contracts/Marketplace.sol	1	————	96	83	49	23	58	
	contracts/DividendVault.sol	1	————	163	135	79	34	56	
	contracts/DealToken.sol	1	————	290	247	206	9	195	
	contracts/chainlink/AggregatorV3Interface.sol	————	1	35	5	3	4	11	
	contracts/Issuer.sol	1	————	88	84	52	22	16	————
	<b>Totals</b>	<b>4</b>	<b>3</b>	<b>719</b>	<b>574</b>	<b>395</b>	<b>118</b>	<b>352</b>	  

## 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	DealToken	Freezing	152, 160	Default admin role can freeze address and tokens You cannot transfer tokens if it has frozen

**Look at alleviations**

## Informational issues

**No informational issues**

## Alleviations from the Team

- Default admin role can freeze address and tokens. You cannot transfer tokens if it has frozen. L152, L160

Owner can lock user funds

Owner can blacklist:

- From the team:
  - **These tokens are sold as securities and certain rules on top of ERC20 are required. These follow the standards like ERC1400 (<https://github.com/SecurityTokenStandard/EIP-Spec/blob/master/eip/eip-1400.md>) and the ERC3643 (<https://eips.ethereum.org/EIPS/eip-3643>) which mandate actions.**

**We recommend you to do your own research every time.**

## 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.

### 30. April 2022:

- Read whole report for more information



## SWC Attacks

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

<a href="#">SW C-1 27</a>	Arbitrary Jump with Function Type Variable	<a href="#">CWE-695: Use of Low-Level Functionality</a>	<b>PASSED</b>
<a href="#">SW C-1 25</a>	Incorrect Inheritance Order	<a href="#">CWE-696: Incorrect Behavior Order</a>	<b>PASSED</b>
<a href="#">SW C-1 24</a>	Write to Arbitrary Storage Location	<a href="#">CWE-123: Write-what-where Condition</a>	<b>PASSED</b>
<a href="#">SW C-1 23</a>	Requirement Violation	<a href="#">CWE-573: Improper Following of Specification by Caller</a>	<b>PASSED</b>
<a href="#">SW C-1 22</a>	Lack of Proper Signature Verification	<a href="#">CWE-345: Insufficient Verification of Data Authenticity</a>	<b>PASSED</b>
<a href="#">SW C-1 21</a>	Missing Protection against Signature Replay Attacks	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>
<a href="#">SW C-1 20</a>	Weak Sources of Randomness from Chain Attributes	<a href="#">CWE-330: Use of Insufficiently Random Values</a>	<b>PASSED</b>
<a href="#">SW C-11 9</a>	Shadowing State Variables	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-11 8</a>	Incorrect Constructor Name	<a href="#">CWE-665: Improper Initialization</a>	<b>PASSED</b>
<a href="#">SW C-11 7</a>	Signature Malleability	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>

<a href="#">SW C-11 6</a>	Timestamp Dependence	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 5</a>	Authorization through tx.origin	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 4</a>	Transaction Order Dependence	<a href="#">CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')</a>	<b>PASSED</b>
<a href="#">SW C-11 3</a>	DoS with Failed Call	<a href="#">CWE-703: Improper Check or Handling of Exceptional Conditions</a>	<b>PASSED</b>
<a href="#">SW C-11 2</a>	Delegatecall to Untrusted Callee	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 1</a>	Use of Deprecated Solidity Functions	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 0</a>	Assert Violation	<a href="#">CWE-670: Always-Incorrect Control Flow Implementation</a>	<b>PASSED</b>
<a href="#">SW C-1 09</a>	Uninitialized Storage Pointer	<a href="#">CWE-824: Access of Uninitialized Pointer</a>	<b>PASSED</b>
<a href="#">SW C-1 08</a>	State Variable Default Visibility	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-1 07</a>	Reentrancy	<a href="#">CWE-841: Improper Enforcement of Behavioral Workflow</a>	<b>PASSED</b>
<a href="#">SW C-1 06</a>	Unprotected SELFDESTRUCT Instruction	<a href="#">CWE-284: Improper Access Control</a>	<b>PASSED</b>

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

The logo features the words "Solid Proofed" in a white, elegant script font. The word "Solid" is positioned above "Proofed". Behind the text is a faint, stylized shield emblem with a grid-like pattern, rendered in a darker shade of blue. The entire composition is set against a solid blue background.

Solid  
Proofed

**Blockchain Security | Smart Contract Audits | KYC**

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

MADE IN GERMANY