



SOLIDProof
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Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

RealTo Apps

Audit

Security Assessment

30. April, 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
Inheritance Graph	12
CallGraph	13
Scope of Work/Verify Claims	14
Modifiers and public functions	20
Source Units in Scope	22
Critical issues	23
High issues	23
Medium issues	23
Low issues	23
Informational issues	23
Audit Comments	24
SWC Attacks	25

Disclaimer

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

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)
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
@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.

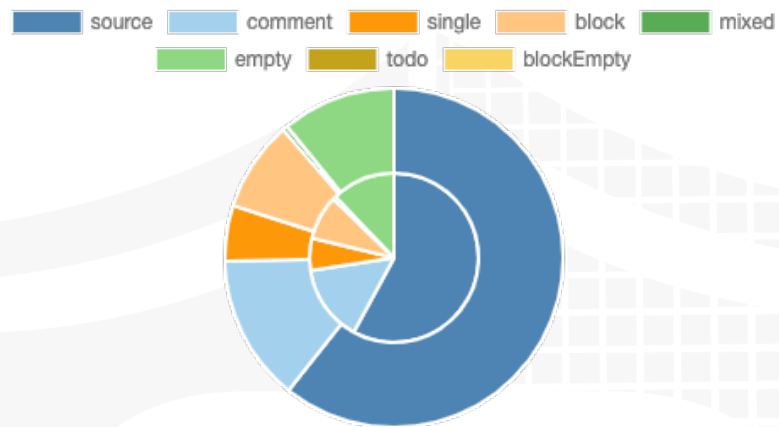
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

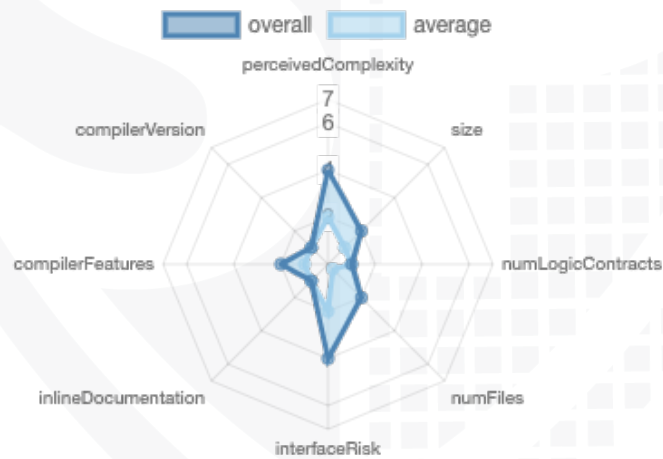
File Name	SHA-1 Hash
contracts/ISnapshotVault.sol	fc97e716de95cef09ee42520d3730f252061330d
contracts/IERC20Snapshot.sol	643e1ad2f4971760af87fe24985d67cc3cfa7602
contracts/Marketplace.sol	c8508810ff094363cafcee6846c83da2edd79b6e
contracts/DividendVault.sol	91b627bac05d876482c97e375e7239fa33567f1c
contracts/DealToken.sol	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)

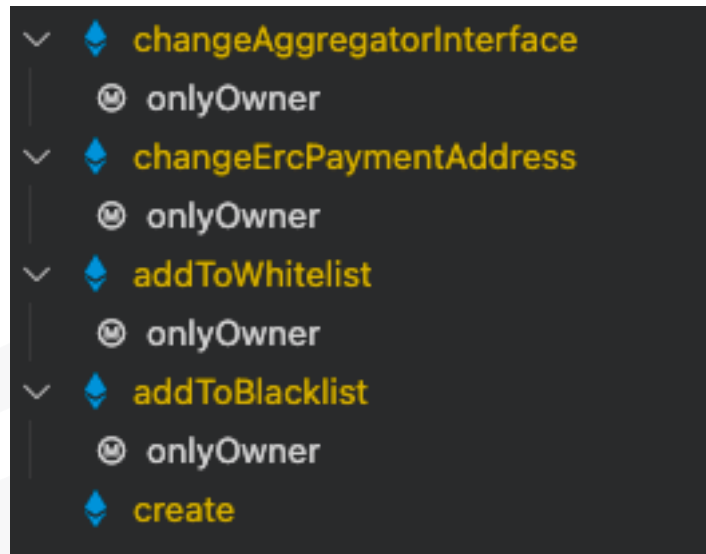
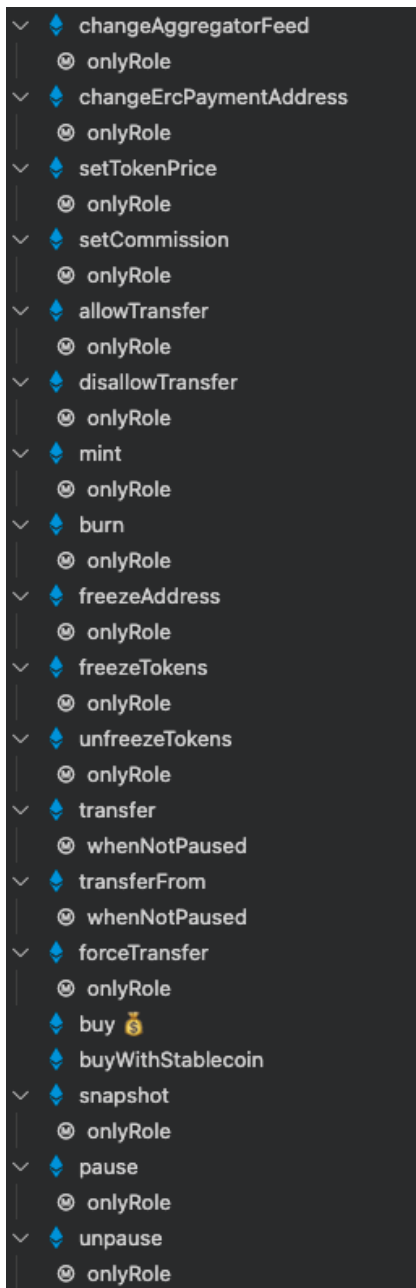
Tested	Verified
✓	✓

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	————
	Totals	4	3	719	574	395	118	352	  

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	All	A floating pragma is set	Top of source files	The current pragma Solidity directive is „^0.8.0“.
#2	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

Issue	File	Type	Line	Description
#1	DealToken	State variables that could be declared constant (constable-states)	38, 37, 36	Add the `constant` attributes to state variables that never change
#2	DividendVault	Error message is missing	161	Provide an error message for require statement

#3	Main	NatSpec documentation missing	-	If you started to comment your code, also comment all other functions, variables etc.
----	------	-------------------------------	---	---

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
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	NOT 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	NOT 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	NOT 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 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 pattern, set against a solid blue background.

Solid
Proofed

Blockchain Security | Smart Contract Audits | KYC

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

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