SOLIDProof

Bring trust into your projects

Blockchain Security | Smart Contract Audits | KYC Development | Marketing

MADE IN GERMANY

CDP

AUDIT

SECURITY ASSESSMENT

16. January, 2024

FOR

Introduction

SolidProof.io is a brand of the officially registered company MAKE Network GmbH, based in Germany. We're mainly focused on Blockchain Security such as Smart Contract Audits and KYC verification for project teams.
Solidproof.io assess potential security issues in the smart contracts implementations, review for potential inconsistencies between the code base and the whitepaper/documentation, and provide suggestions for improvement.

Disclaimer

SolidProof.io reports are not, nor should be considered, an "endorsement"or "disapproval" of any particular project or team. These reports are not, nor should be considered, an indication of the economics or value of any "product" or "asset" created by any team. SolidProof.io do not cover testing or auditing the integration with external contract or services (such as Unicrypt, Uniswap, PancakeSwap etc'...)

SolidProof.io Audits do not provide any warranty or guarantee regarding the absolute bug-free nature of the technology analyzed, nor do they provide any indication of the technology proprietors. SolidProof Audits should not be used in any way to make decisions around investment or involvement with any particular project. These reports in no way provide investment advice, nor should be leveraged as investment advice of any sort.

SolidProof.io Reports represent an extensive auditing process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology. Blockchain technology and cryptographic assets present a high level of ongoing risk. SolidProof's position is that each company and individual are responsible for their own due diligence and continuous security. SolidProof in no way claims any guarantee of the security or functionality of the technology we agree to analyze.

Project Overview

Summary

Project Name	CarpeDiem Pension (CDP)
Website	https://carpediempension.com/
About the project	Carpe Diem Pension (CDP) protocol contains Pension, Auction and CDPtoken contract. The CDP token can be deposited in a Pension contract, and rewards can be earned on it. Users can deposit in auctions with native blockchain tokens and would be able to collect shares, which then can be used to earn CDP tokens.
Chain	Pulse chain
Language	Solidity
Codebase	CDPToken:https://otter.pulsechain.com/address/0x6f0dDa6b522fcC7807CcacA4D37eF6958e95E1B9/contract Auction:https://otter.pulsechain.com/address/0x5333FBd6A612E2d6B3d8282d43fD3E33Ce013Ff6/contract Pension:https://otter.pulsechain.com/address/0x7f683AaC0e76B270F0ebB1383a08c5b3B0d65D0e/contract
Commit	N/A
Unit Tests	Provided

Social Medias

Telegram	https://t.me/CarpeDiemCDP
Twitter	https://twitter.com/CarpeDiemCDP
Facebook	N/A
Instagram	N/A
GitHub	N/A
Reddit	N/A
Medium	N/A
Discord	https://discord.com/invite/carpediem
YouTube	N/A
TikTok	N/A
LinkedIn	N/A

Audit Summary

Version	Delivery Date	Change Log
v1.0	09. November 2023	· Layout Project · Automated/ Manual-Security Testing · Summary
v1.3	16. January 2024	· Reaudit

Note – The following audit report presents a comprehensive security analysis of the smart contract utilized in the project that includes outside manipulation of the contract's functions in a malicious way. This analysis did not include functional testing (or unit testing) of the contract/s logic. We cannot guarantee 100% logical correctness of the contract as we did not functionally test it. This includes internal calculations in the formulae used in the contract.

File Overview

The Team provided us with the files that should be tested in the security assessment. This audit covered the following files listed below with an SHA-1 Hash.

File Name	SHA-1 Hash
contracts/Auction.sol	473bab83528b9ebae67fb24073d20460c2251805
contracts/Pension.sol	a0245bde01860706fe8aa0e38642486a64067035
contracts/CDPToken.sol	cf00cd453f45898064e28e8ace83e412163906a3

Please note: Files with a different hash value than in this table have been modified after the security check, either intentionally or unintentionally. A different hash value may (but need not) be an indication of a changed state or potential vulnerability that was not the subject of this scan.

Imported packages.

Used code from other Frameworks/Smart Contracts.

Dependency / Import Path	Count
@openzeppelin/contracts/access/Ownable.sol	2
@openzeppelin/contracts/proxy/utils/Initializable.sol	2
@openzeppelin/contracts/token/ERC20/ERC20.sol	1
@openzeppelin/contracts/token/ERC20/IERC20.sol	2
@openzeppelin/contracts/token/ERC20/extensions/ERC20Permit.sol	1

Note for Investors: We only audited contracts mentioned in the scope above. All contracts related to the project apart from that are not a part of the audit, and we cannot comment on its security and are not responsible for it in any way.

External/Public functions

External/public functions are functions that can be called from outside of a contract, i.e., they can be accessed by other contracts or external accounts on the blockchain. These functions are specified using the function declaration's external or public visibility modifier.

State variables

State variables are variables that are stored on the blockchain as part of the contract'sstate. They are declared at the contract level and can be accessed and modified by any function within the contract. State variables can be needed within visibility modifier, such as public, private or internal, which determines the access level of the variable.

Components

📝 Contracts	📚 Libraries	🔍 Interfaces	🎨 Abstract
3	0	2	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.

🌐 Public	💰 Payable
32	2

External	Internal	Private	Pure	View
23	29	0	0	8

StateVariables

Total	🌐 Public
26	26

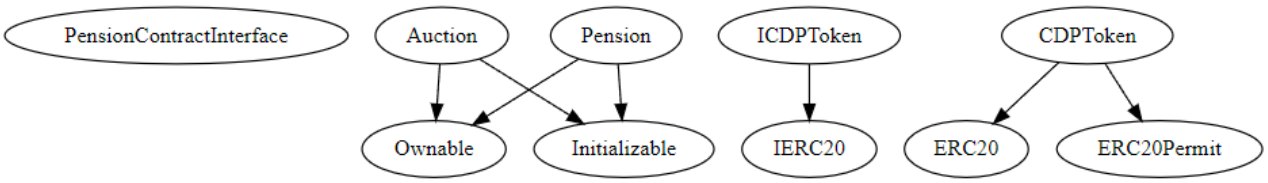
Capabilities

Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
0.8.20	----------	yes		----------

Transfers ETH	Low-Level Calls	Delegate Call	Uses Hash Functions	ECRecover	New/Create/Create2
yes					

Inheritance Graph

An inheritance graph is a graphical representation of the inheritance hierarchy among contracts. In object-oriented programming, inheritance is a mechanism that allows one class (or contract, in the case of Solidity) to inherit properties and methodsfrom another class. It shows the relationships between different contracts and how they are related to each other through inheritance.



Audit Information

Vulnerability & Risk Level

Risk represents the probability that a certain source threat will exploit the vulnerability and the impact of that event on the organization or system.The 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 executingthe 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 check the repository for security-related issues, code quality, and compliance with specifications and best practices. To this end, our team of experienced pen-testers andsmart contract developers reviewed the code line by line and documented any issues discovered.

We check every file manually. We use automated tools only so that they help us achieve faster and better results.

Methodology

The auditing process follows a routine series of steps:

1. Code review that includes the following:
   a. Reviewing the specifications, sources, and instructions provided to
   SolidProof to ensure we understand the size, scope, and functionality of the
   smart contract.
   b. Manual review of the code, i.e., reading the source code line by line to identify potential vulnerabilities.
   c. Comparison to the specification, i.e., verifying that the code does what is described in the specifications, sources, and instructions provided to SolidProof.

2. Testing and automated analysis that includes the following:
   a. Test coverage analysis determines whether test cases cover code and how much code is executed when those test cases are executed.
   b. Symbolic execution, which is analysing a program to determine what inputs cause each part of a program to execute.

3. Review best practices, i.e., review smart contracts to improve efficiency, effectiveness, clarity, maintainability, security, and control based on best practices, recommendations, and research from industry and academia.

4. Concrete, itemized and actionable recommendations to help you secure your smart contracts

Overall Security

Upgradeability

Contract is not an upgradable	✅ **Deployer cannot update the contract with new functionalities.**
Description	The deployer or owner cannot upgrade any functionalities in the contract.
Comment	The ownership of the contract is renounced. Hence, the owner cannot modify or change the contract settings.

Ownership

Contract ownership is renounced.	✅ **The ownership is renounced.**

Description	The ownership of the token is renounced.
Example	N/A
Comment	N/A

Note – *The contract cannot be considered as renounced till it is not deployed or having some functionality that can change the state of the contract.*

Ownership Privileges

These functions can be dangerous. Please note that abuse can lead to financial loss. We have a guide where you can learn more about these Functions.

Minting tokens

Minting tokens refer to the process of creating new tokens in a cryptocurrency or blockchain network. This process is typically performed by the project's owner or designated authority, who has the ability to add new tokens to the network's total supply.

Contract owner can mint new tokens.	❌ **The owner can mint new tokens.**
Description	Owners who have the ability to mint new tokens can reward themselves or other stakeholders, who can then sell the newly minted tokens on a cryptocurrency exchange to raise funds. However, there is a risk that the owner may abuse this power, leading to a decrease in trust and credibility in the project or platform. If stakeholders perceive that the owner is using their power to mint new tokens unfairly or without transparency, it can result in decreased demand for the token and a reduction in its value.
Comment	The pension contract can mint new tokens after the initial deployment which can increase the supply of tokens and the user may lose their token values.

File/Line(s): L42-51
Codebase: CDPToken.sol

```
function mint(
    address to,
    uint256 amount
) public {
    require(
        msg.sender == minterAddress,
        "No permission"
    );
    _mint(to, amount);
}
```

Burning tokens

Burning tokens is the process of permanently destroying a certain number of tokens, reducing the total supply of a cryptocurrency or token. This is usually done to increase the value of the remaining tokens, as the reduced supply can create scarcity and potentially drive up demand.

Contract owner cannot burn tokens	✅ **The owner cannot burn tokens.**
Description	The owner is not able burn tokens without any allowances.
Comment	N/A

Blacklist addresses

Blacklisting addresses in smart contracts is the process of adding a certain address to a blacklist, effectively preventing them from accessing or participating in certain functionalities or transactions within the contract. This can be useful in preventing fraudulent or malicious activities, such as hacking attempts or money laundering.

Contract owner cannot blacklist addresses.	✅ **The owner cannot blacklist wallets.**
Description	The owner cannot blacklist addresses for transferring of tokens.
Comment	N/A

Fees and Tax

In some smart contracts, the owner or creator of the contract can set fees for certain actions or operations within the contract. These fees can be used to cover the cost of running the contract, such as paying for gas fees or compensating the contract's owner for their time and effort indeveloping and maintaining the contract.

Contract owner cannot set fees more than 25%.	✅ **The owner cannot set fees more than 25%.**

Description	The owner cannot set fees more than 25%.
Comment	N/A

Lock User Funds

In a smart contract, locking refers to the process of restricting access to certain tokens or assets for a specified period of time. When token or assets are locked in a smart contract, they cannot be transferred or used until the lock-up period has expired or certain conditions have been met.

Contract owner cannot lock functions.	✅ **The owner cannot lock the contract.**
Description	The owner cannot be able to lock the contract.
Comment	N/A

Centralization Privileges

Centralization can arise when one or more parties have privileged access or control over the contract's functionality, data, or decision-making. This can occur, for example,if the contract is controlled by a single entity or if certain participants have special permissions or abilities that others do not.

In the project, there are authorities that have access to the following functions:

File	Privileges
Auction.sol **CDPToken.sol** **Pension.sol**	➢ The owner can start the auction. ➢ The pension contract can mint unlimited amount of tokens after initial deployment. ➢ The auction contract can mint shares for the users. ➢ The auction contract can mint tokens for daily distribution and for the rewards that are going to be distributed. ➢ The auction contract can update the share distribution in the contract.

Recommendations

To avoid potential hacking risks, it is advisable for the client to manage the private key of the privileged account with care. Additionally, we recommend enhancing the security practices of centralized privileges or roles in the protocol through a decentralized mechanism or smart-contract-based accounts, such as multi-signature wallets.

Here are some suggestions of what the client can do:

- Consider using multi-signature wallets: Multi-signature wallets require multiple parties to sign off on a transaction before it can be executed, providing an extra layer of security e.g. Gnosis Safe
- Use of a timelock at least with a latency of e.g. 48-72 hours for awareness of privileged operations
- Introduce a DAO/Governance/Voting module to increase transparency and user involvement
- Consider Renouncing the ownership so that the owner cannot modify any state variables of the contract anymore. Make sure to set up everything before renouncing.

Audit Result

Critical Issues

No critical issues

High Issues

No high issues

Medium Issue

#1 | The owner can mint new tokens.

File	Severity	Location	Status
CDPToken.sol	Medium	L42-51	ACK

Description – The pension can mint new tokens after the initial deployment which can manipulate the supply of tokens and the user may lose their token values.

Remediation – There should not be any minting after the initial deployment but if there will be the functionality then there must be a certain threshold value where the number of tokens cannot exceed that.

Alleviation – The amount to be minted is based on calculations done by the auction and pension contracts. Hence, there will not be any minting which can be done externally.

Low Issue

#1 | Missing 'require' error message.

File	Severity	Location	Status
Pension.sol	Low	L242, L256, L268	Fixed

Description – It is recommended to add the error message in the 'require' check.

#2 | Missing threshold.

File	Severity	Location	Status
CDPToken.sol	Low	L42-51, L58-63	ACK
Pension.sol	Low	L313-329	ACK

Description – There must be a certain threshold present while setting the parameters.

Remediation – Add a 'require' check where the value cannot be more than that particular amount.

#3 | Missing visibility.

File	Severity	Location	Status
Pension.sol	Low	L52, 79	Fixed

Description – Always Add 'public' or 'private' during the initiazation of a state variable or a mapping.

#4 | Missing functionality.

File	Severity	Location	Status
Auction.sol	Low	L52, 79	ACK

Description – The 'swiss_addr' cannot be updated once it is set. If the wallet is tempered or lost, then you cannot be able to modify it in the contract.

Remediation – Add a function to update the 'swiss_addr' in the contract.

Informational Issue

#1 | Contract doesn't import npm packages from source (like OpenZeppelin etc.)

File	Severity	Location	Status
All	Informational	--	Fixed

Description – We recommend importing all packages from npm directly without flattening the contracts. Functions could be modified or can be susceptible to vulnerabilities.

#2 | Natspec documentation missing.

File	Severity	Location	Status
All	Informational	--	Fixed

Description – If you started to comment on your code, also comment on all other functions, variables, etc.

Legend for the Issue Status

Attribute or Symbol	Meaning
Open	The issue is not fixed by the project team.
Fixed	The issue is fixed by the project team.
Acknowledged(ACK)	The issue has been acknowledged or declared as part of business logic.

Blockchain Security | Smart Contract Audits | KYC Development | Marketing

MADE IN GERMANY