



Smart Contract Security Audit Report

Pension Plan

December 2022

Security Status



www.hacksafe.io



Audit Details



Audited project

Pension Plan



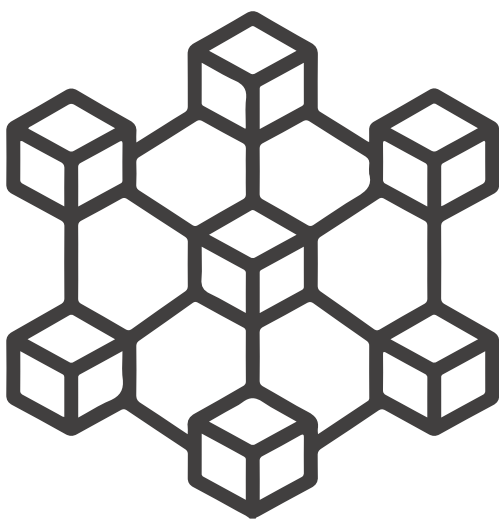
Deployer address

0x53c538ae77e9dfed2337c94a26451c9a6ee4b435



Client contacts

Pension Plan Team



Blockchain

Ethereum



Website

<https://pensionplan.finance/>

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security. No product code has been reviewed.

Procedure

Step 1 - In-Depth Manual Review

Manual line-by-line code reviews to ensure the logic behind each function is sound and safe from various attack vectors. This is the most important and lengthy portion of the audit process (as automated tools often cannot find the nuances that lead to exploits such as flash loan attacks).

Step 2 - Automated Testing

Simulation of a variety of interactions with your Smart Contract on a test blockchain leveraging a combination of automated test tools and manual testing to determine if any security vulnerabilities exist.

Step 3 – Leadership Review

The engineers assigned to the audit will schedule meetings with our leadership team to review the contracts, any comments or findings, and ask questions to further apply adversarial thinking to discuss less common attack vectors.

Step 4 - Resolution of Issues

Consulting with the team to provide our recommendations to ensure the code's security and optimize its gas efficiency, if possible. We assist project team's in resolving any outstanding issues or implementing our recommendations.

Step 5 - Published Audit Report

Boiling down results and findings into an easy-to-read report tailored to the project. Our audit reports highlight resolved issues and any risks that exist to the project or its users, along with any remaining suggested remediation measures. Diagrams are included at the end of each report to help users understand the interactions which occur within the project.

Background

HackSafe was commissioned by Pension Plan to perform an audit of smart contracts:

- <https://etherscan.io/address/0xf14b9ADF84812bA463799357f4dc716b4384010B#code>

The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

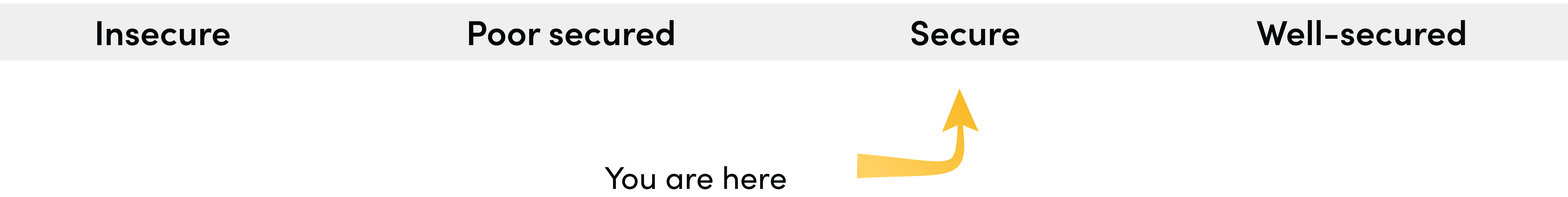
Contract Details

Token contract details for 27.12.2022

Token Type	: DEFI
Contract name	: PensionPlan
Contract address	: 0xf14b9ADF84812bA463799357f4dc716b4384010B
Total supply	: 1,000,000,000,000
Token ticker	: PP
Decimals	: 8
Token Holders	: 221
Transactions count	: 957
Compiler version	: v0.8.7+commit.e28d00a7
Contract deployer address	: 0xfd040c18c53689e5529fe67982e90336ffbf309e
Owner address	: 0x53c538Ae77E9DFeD2337C94a26451C9a6eE4B435

Audit Summary

According to the standard audit assessment, Customer`s solidity smart contracts are **“Secure”**. This token contract does contain owner control, which do not make it fully decentralized.



We used various tools like Slither, Mythril and Remix IDE. At the same time this finding is based on critical analysis of the manual audit. All issues found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the issues checking status.

We found 0 critical, 0 high, 1 medium and 0 low.

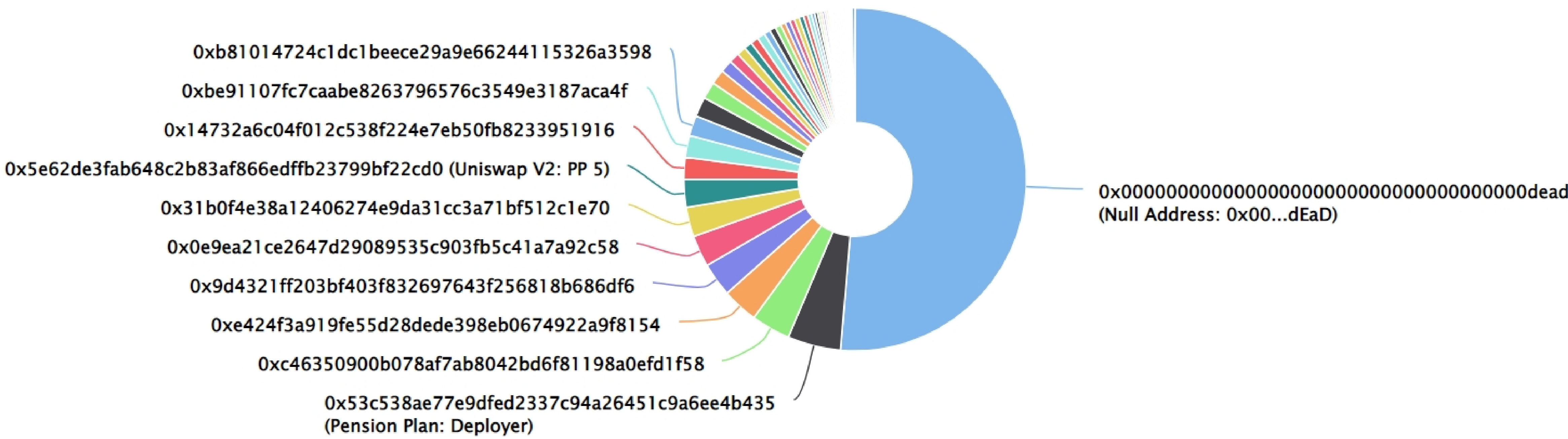
Pension Plan Token Distribution

💡 The top 100 holders collectively own 99.73% (997,303,361,204.76 Tokens) of Pension Plan

💡 Token Total Supply: 1,000,000,000,000.00 Token | Total Token Holders: 221


Pension Plan Top 100 Token Holders

Source: Etherscan.io



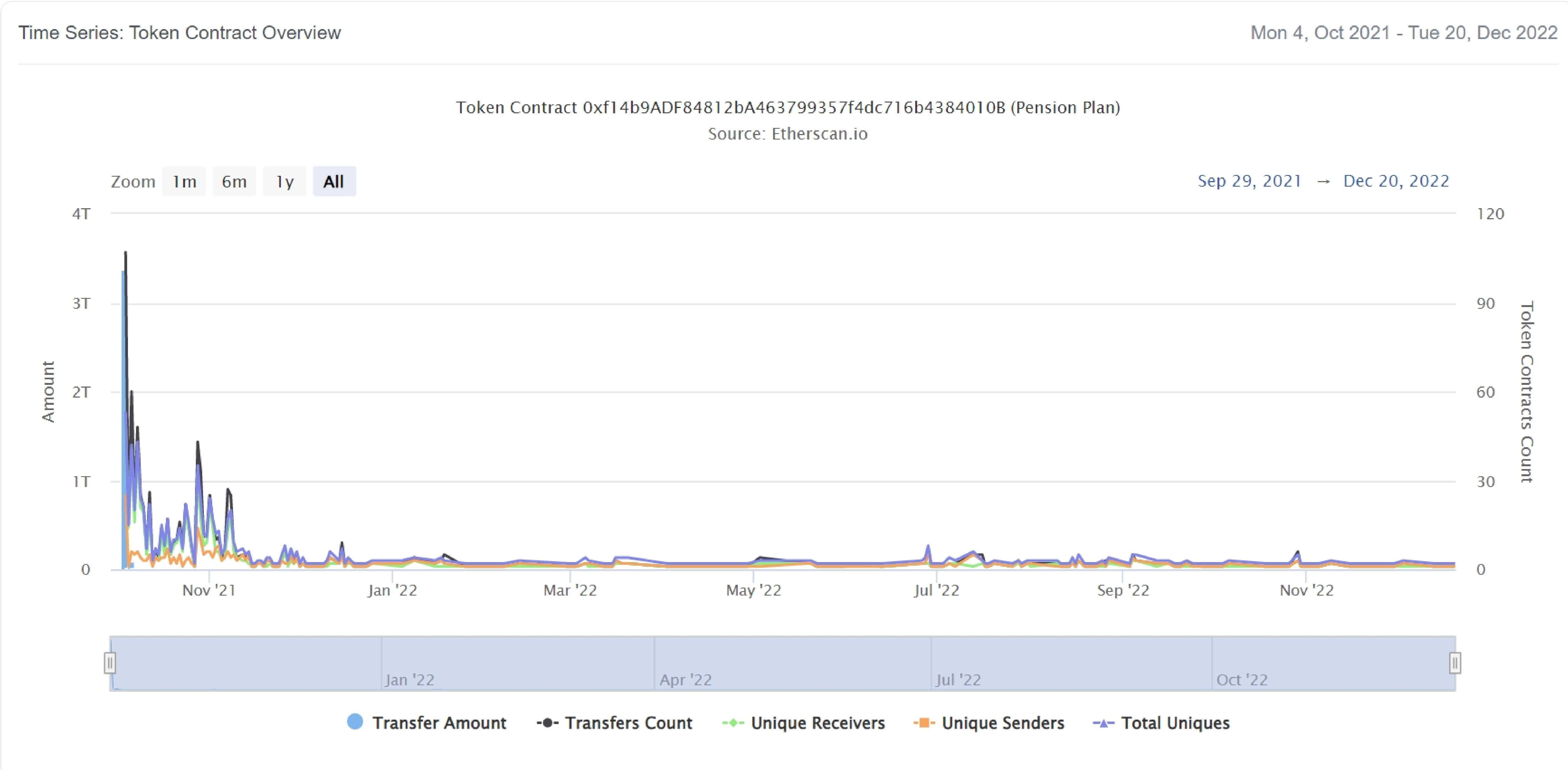
Pension Plan Top 20 Token Holders

(A total of 997,303,361,204.76 tokens held by the top 100 accounts from the total supply of 1,000,000,000,000.00 token)

Rank	Address	Quantity (Token)	Percentage
1	Null Address: 0x00...dEaD	513,779,421,209.33883026	51.3779%
2	Pension Plan: Deployer	50,000,000,000	5.0000%
3	0xc46350900b078af7ab8042bd6f81198a0efd1f58	37,072,502,458.50282216	3.7073%
4	0xe424f3a919fe55d28dede398eb0674922a9f8154	33,609,864,270.8416214	3.3610%
5	0x9d4321ff203bf403f832697643f256818b686df6	31,947,627,341.0370226	3.1948%
6	0x0e9ea21ce2647d29089535c903fb5c41a7a92c58	29,575,916,360.00151627	2.9576%
7	0x31b0f4e38a12406274e9da31cc3a71bf512c1e70	27,847,890,292.52395181	2.7848%
8	 Uniswap V2: PP 5	26,295,347,263.83126642	2.6295%
9	0x14732a6c04f012c538f224e7eb50fb8233951916	20,650,638,136.89187278	2.0651%
10	0xbe91107fc7caabe8263796576c3549e3187aca4f	20,569,237,036.79042495	2.0569%
11	0xb81014724c1dc1beece29a9e66244115326a3598	19,098,836,786.18460833	1.9099%
12	0x4e639b2957f6eeb80e1d6b3ed5cd7cbc5d3c6071	18,388,014,038.52775867	1.8388%
13	0x1ff417bab3790ffd80eab7b4c95e3c40069c86cb	15,991,142,379.2251766	1.5991%
14	0x9cf6a3d7eb8c62a5256a020e48f153c6d5dd6909	13,954,412,532.34837307	1.3954%
15	0xa4a9552d7d6b7e9f454acd1765ef5cc049672d05	11,686,844,748.86626596	1.1687%
16	0xafd712e0da07c6ec6617d5f9fad474cfd8dddddad	9,766,063,720.03677175	0.9766%
17	0x662f6ef2092c126b6ee0da44e6b863f30971880d	8,642,696,973.29586436	0.8643%
18	0xbd64673d6c8df33632f7ffcd025f187c37435b34	7,462,504,165.64915137	0.7463%
19	0x7de9688dd8ff36128e996252009d8a1adf5a7c78	7,430,906,618	0.7431%
20	0xf5e9e7205966212971b3f91a5b81c0b965831b04	7,413,258,972.90843502	0.7413%

Pension Plan Token Distribution

Pension Plan Contract Overview



Contract functions details

+[Int] IERC20

- [Ext] totalSupply
- [Ext] balanceOf
- [Ext] transfer
- [Ext] allowance
- [Ext] approve
- [Ext] transferFrom

+[Int] IERC20Metadata (IERC20)

- [Ext] name
- [Ext] symbol
- [Ext] decimals

+Context

- [Int] _msgSender
- [Int] _msgData

+[Lib] Math

- [Int] max
- [Int] min
- [Int] average
- [Int] ceilDiv

+[Lib] Arrays

- [Int] findUpperBound

+[Lib] Counters

- [Int] current
- [Int] increment #
- [Int] decrement #
- [Int] reset #

+Ownable (Context)

- [Pub]< Constructor > #
- [Pub] owner
- [Pub] renounceOwnership #
 - modifiers: onlyOwner
- [Pub] transferOwnership #
 - modifiers: onlyOwner
- [Pvt] _setOwner #

Contract functions details

+[Lib] Address

- [Int] isContract
- [Int] sendValue #
- [Int] functionCall #
- [Int] functionCall #
- [Int] functionCallWithValue #
- [Int] functionCallWithValue #
- [Int] functionStaticCall
- [Int] functionStaticCall
- [Int] functionDelegateCall #
- [Int] functionDelegateCall #
- [Int] verifyCallResult

+[Int] IUniswapV2Factory

- [Ext] feeTo
- [Ext] feeToSetter
- [Ext] getPair
- [Ext] allPairs
- [Ext] allPairsLength
- [Ext] createPair #
- [Ext] setFeeTo #
- [Ext] setFeeToSetter #

+[Int] IUniswapV2Pair

- [Ext] name
- [Ext] symbol
- [Ext] decimals
- [Ext] totalSupply
- [Ext] balanceOf
- [Ext] allowance
- [Ext] approve #
- [Ext] transfer #
- [Ext] transferFrom #
- [Ext] DOMAIN_SEPARATOR
- [Ext] PERMIT_TYPEHASH
- [Ext] nonces
- [Ext] permit #
- [Ext] MINIMUM_LIQUIDITY
- [Ext] factory

Contract functions details

- [Ext] token0
- [Ext] token1
- [Ext] getReserves
- [Ext] price0CumulativeLast
- [Ext] price1CumulativeLast
- [Ext] kLast
- [Ext] burn #
- [Ext] swap #
- [Ext] skim #
- [Ext] sync #
- [Ext] initialize #

+ [Int] IUniswapV2Router01

- [Ext] factory
- [Ext] WETH
- [Ext] addLiquidity #
- [Ext] addLiquidityETH (\$)
- [Ext] removeLiquidity #
- [Ext] removeLiquidityETH #
- [Ext] removeLiquidityWithPermit #
- [Ext] removeLiquidityETHWithPermit #
- [Ext] swapExactTokensForTokens #
- [Ext] swapTokensForExactTokens #
- [Ext] swapExactETHForTokens (\$)
- [Ext] swapTokensForExactETH #
- [Ext] swapExactTokensForETH #
- [Ext] swapETHForExactTokens (\$)
- [Ext] quote
- [Ext] getAmountOut
- [Ext] getAmountIn
- [Ext] getAmountsOut
- [Ext] getAmountsIn

+ [Int] IUniswapV2Router02 (IUniswapV2Router01)

- [Ext] removeLiquidityETHSupportingFeeOnTransferTokens #
- [Ext] removeLiquidityETHWithPermitSupportingFeeOnTransferTokens #
- [Ext] swapExactTokensForTokensSupportingFeeOnTransferTokens #
- [Ext] swapExactETHForTokensSupportingFeeOnTransferTokens (\$)
- [Ext] swapExactTokensForETHSupportingFeeOnTransferTokens #

Contract functions details

+PensionPlan (Context, IERC20, IERC20Metadata, Ownable)

- [Pub] <Constructor > #
- [Pub] name
- [Pub] symbol
- [Pub] decimals
- [Pub] totalSupply
- [Pub] balanceOf
- [Pub] transfer #
- [Pub] allowance
- [Pub] approve #
- [Pub] transferFrom #
- [Pub] increaseAllowance #
- [Pub] decreaseAllowance #
- [Int] _approve #
- [Pub] eligibleSupply
- [Pub] eligibleSupplyAt
- [Pub] isExcludedFromReward
- [Pub] excludeFromReward #
 - modifiers: onlyOwner
- [Pub] includeInReward #
 - modifiers: onlyOwner
- [Pub] isBanned
- [Ext] ban #
 - modifiers: onlyOwner
- [Ext] unban #
 - modifiers: onlyOwner
- [Prv] _processPayouts #
- [Prv] _handleSwapAndPayout #
- [Int] _transfer #
- [Int] _beforeTokenTransfer #
- [Prv] swapTokensForEth #
 - modifiers: lockTheSwap
- [Prv] swapETHForTokensAndBurn #
 - modifiers: lockTheSwap
- [Ext] setMinimumTokensBeforeSwap #
 - modifiers: onlyOwner
- [Ext] setMarketingAddress #
 - modifiers: onlyOwner

Contract functions details

- [Ext] setDevelopmentAddress #
 - modifiers: onlyOwner
- [Ext] setFoundationAddress #
 - modifiers: onlyOwner
- [Ext] setHachikolnuBuybackAddress #
 - modifiers: onlyOwner
- [Ext] setMinimumETHBeforePayout #
 - modifiers: onlyOwner
- [Ext] setPayoutsToProcess #
 - modifiers: onlyOwner
- [Ext] manuallyProcessPayouts #
 - modifiers: onlyOwner
- [Int] _snapshot #
- [Int] _getCurrentSnapshotId
- [Pub] balanceOfAt
- [Pub] totalSupplyAt
- [Prv] _valueAt
- [Prv] _updateAccountSnapshot #
- [Prv] _updateTotalSupplySnapshot #
- [Prv] _updateSnapshot #
- [Prv] _lastSnapshotId
- [Ext] <Fallback > (\$)

(\$) = payable function

= non-constant function

Issues Checking Status

No.	Title	Status
1.	Compiler error	Passed
2.	Missing Input Validation	Passed
3.	Race conditions and Reentrancy. Cross-function race conditions.	Passed
4.	Possible delays in data delivery	Passed
5.	Oracle calls.	Passed
6.	Timestamp dependence.	Passed
7.	Integer Overflow and Underflow	Passed
8.	DoS with Revert.	Passed
9.	DoS with block gas limit.	Medium Issue
10.	Methods execution permissions.	Passed
11.	Economy model of the contract.	Passed
12.	Private use data leaks.	Passed
13.	Malicious Event log.	Passed
14.	Scoping and Declarations.	Passed
15.	Uninitialized storage pointers.	Passed
16.	Arithmetic accuracy.	Passed
17.	Design Logic.	Passed
18.	Safe Open Zeppelin contracts implementation and usage.	Passed
19.	Incorrect Naming State Variable	Passed
20.	Too old version	Passed

Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to assets loss or data manipulations.
High	High-level vulnerabilities are difficult to exploit; however, they also have a significant impact on smart contract execution, e.g., public access to crucial functions
Medium	Medium-level vulnerabilities are important to fix; however, they can't lead to assets loss or data manipulations.
Low	Low-level vulnerabilities are mostly related to outdated, unused, etc. code snippets that can't have a significant impact on execution.

Security Issues

✔ Critical Severity Issues

No critical severity issue found.

✔ High Severity Issues

No high severity issue found.

✔ Medium Severity Issues

One medium severity issue found.

1. Out of gas

- **Issue:**

The function `includeInReward()` uses the loop to find and remove addresses from the `_excluded` list. Function will be aborted with `OUT_OF_GAS` exception if there will be a long excluded addresses list.

The functions `eligibleSupply()` and `eligibleSupplyAt()` also uses the loop for evaluating total supply. It also could be aborted with `OUT_OF_GAS` exception if there will be a long excluded addresses list

The functions `unban()` uses the loop to find and remove addresses from `_banned` list. It also could be aborted with `OUT_OF_GAS` exception if there will be a long banned addresses list.

- **Recommendation**

Check that the addresses array length is not too big.

✔ Low Severity Issues

No low severity issue found.

Notes:

No Transfer event emitted on taking a fee. And the amount written in the event is not correct.

Centralization

Owner privileges :

- Pension Plan Contract:
 - Owner Can Include In And Exclude From Reward.
 - Owner Can Include In And Exclude From Banned List (No Transfer For These Addresses).
 - Owner Can Change Minimum Tokens Before Swap Value.
 - Owner Can Change Minimum ETH Before Payout Value.
 - Owner Can Change Marketing, Development, Foundation And Hachikoinu Buyback Addresses.
 - Owner Can Change Payouttoprocess Value.
 - Owner Can Manually Process Payouts.

This smart contract has some functions which can be executed by the admin (Owner) only. If the admin wallet private key would be compromised, then it would create trouble, as smart contract ownership has not been renounced.

Conclusion

Smart contract contains medium severity issues! The further transfer and operations with the fund raised are not related to this particular contract.

HackSafe note: Please check the disclaimer above and note, the audit makes no statements or warranties on business model, investment attractiveness or code sustainability. The report is provided for the only contract mentioned in the report and does not include any other potential contracts deployed by Owner.