CFG NINJA AUDITS

Security Assessment

ZKChain Staking

May 15, 2023

Audit Status: Pass

Audit Edition: Advance

POWERED BY BLADE POOL

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Assessment Summary

This report has been prepared for ZKChain Staking on the Binance Smart Chain network. CFGNINJA provides both client-centered and user-centered examination of the smart contracts and their current status when applicable. This report represents the security assessment made to find issues and vulnerabilities on the source code along with the current liquidity and token holder statistics of the protocol.

A comprehensive examination has been performed, utilizing Cross Referencing, Static Analysis, In-House Security Tools, and line-by-line Manual Review.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Inspecting liquidity and holders statistics to inform the current status to both users and client when applicable.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Verifying contract functions that allow trusted and/or untrusted actors to mint, lock, pause, and transfer assets.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders
- Thorough line-by-line manual review of the entire codebase by industry experts.

Project Overview

Token Summary

Parameter	Result
Address	0xEaAD0A4C8cfE770541F45BF73AA8AC2e8B4671d4
Name	ZKChain
Token Tracker	ZKChain (Staking)
Decimals	18
Supply	1,000,000,000
Platform	Binance Smart Chain
compiler	v0.8.19+commit.7dd6d404
Contract Name	ZKCLPFarm
Optimization	Yes with 200 runs
LicenseType	MIT
Language	Solidity
Codebase	https://bscscan.com/address/0xEaAD0A4C8cfE770541F45BF73AA8AC2e8B4671d4#code
Payment Tx	0x7c01448176f2e9c940183803a4b648038cc99df24f0b796575b3ddf549ebe89f

Main Contract Assessed
Contract Name

Name	Contract	Live
ZKChain	0xEaAD0A4C8cfE770541F45BF73AA8AC2e8B4671d4	Yes

TestNet Contract Assessed
Contract Name

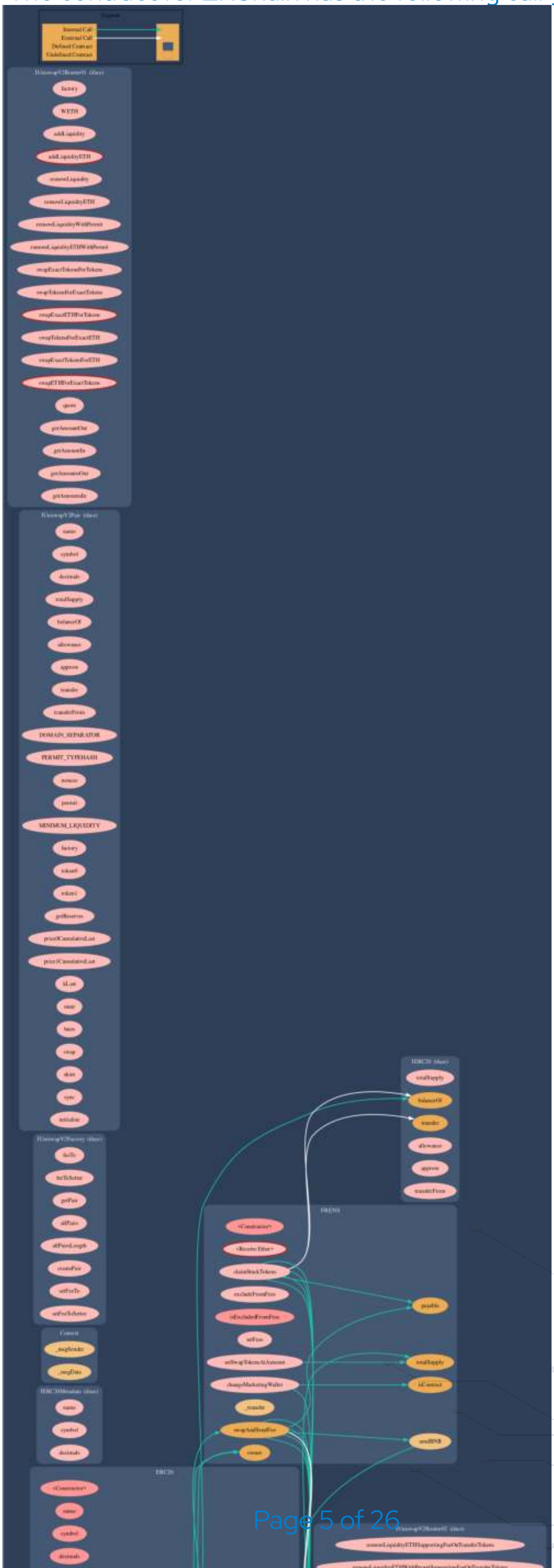
Name	Contract	Live
ZKChain	0xD3AEbB3178ff400A25b8dAC2095A0a6dC3119C57	Yes

Solidity Code Provided

SolID	File Sha-1	FileName
ZKCLPFarm	c0ec8a4207eda547ab8faee418e0ebb0d7efe212	ZKCLPFarm.sol

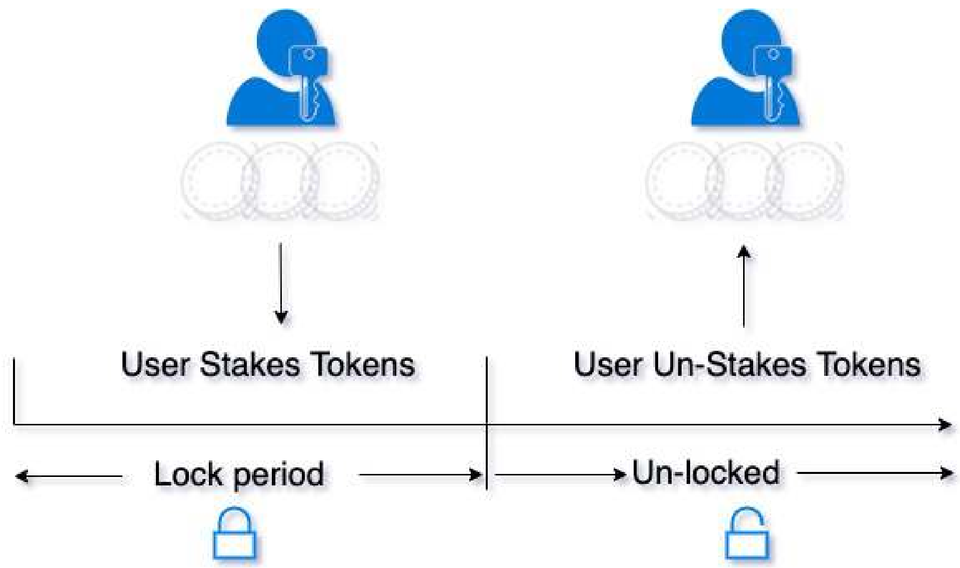
Call Graph

The contract for ZKChain has the following call graph structure.



What is a Staking Contract

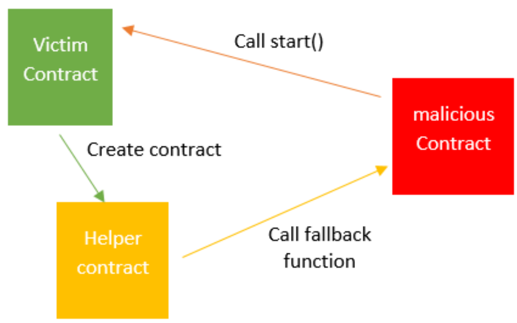
A smart contract which allows users to stake and un-stake a specified ERC20 token. Staked tokens are locked for a specific length of time (set by the contrat owner at the outset). Once the time period has elapsed, the user can remove their tokens again.



The Project Owners of ZKChain have implemented Reentrancy Guard Library

The Team has done a great job to avoid potential reentrancy issues in the contract.

You can read more about the reentrancy library used. ReentrancyGuard



KYC Information

The Project Owners of ZKChain have provided KYC Documentation.

KYC Certificated can be found on the Following:
KYC Data

KYC Information Notes:

Auditor Notes: KYC to be completed by PinkSale, project will be a SAFU Project.

Project Owner Notes:

Smart Contract Vulnerability Checks

The Smart Contract Weakness Classification Registry (SWC Registry) is an implementation of the weakness classification scheme proposed in EIP-1470. It is loosely aligned to the terminologies and structure used in the Common Weakness Enumeration (CWE) while overlaying a wide range of weakness variants that are specific to smart contracts.

ID	Severity	Name	File	location
SWC-100	Pass	Function Default Visibility	ZKCLPFarm.sol	L: 0 C: 0
SWC-101	Pass	Integer Overflow and Underflow.	ZKCLPFarm.sol	L: 0 C: 0
SWC-102	Pass	Outdated Compiler Version file.	ZKCLPFarm.sol	L: 0 C: 0
SWC-103	Low	A floating pragma is set.	ZKCLPFarm.sol	L: 7 C: 0
SWC-104	Pass	Unchecked Call Return Value.	ZKCLPFarm.sol	L: 0 C: 0
SWC-105	Pass	Unprotected Ether Withdrawal.	ZKCLPFarm.sol	L: 0 C: 0
SWC-106	Pass	Unprotected SELFDESTRUCT Instruction	ZKCLPFarm.sol	L: 0 C: 0
SWC-107	Pass	Read of persistent state following external call.	ZKCLPFarm.sol	L: 0 C: 0
SWC-108	Pass	State variable visibility is not set..	ZKCLPFarm.sol	L: 0 C: 0
SWC-109	Pass	Uninitialized Storage Pointer.	ZKCLPFarm.sol	L: 0 C: 0
SWC-110	Pass	Assert Violation.	ZKCLPFarm.sol	L: 0 C: 0

ID	Severity	Name	File	location
SWC-111	Pass	Use of Deprecated Solidity Functions.	ZKCLPFarm.sol	L: 0 C: 0
SWC-112	Pass	Delegate Call to Untrusted Callee.	ZKCLPFarm.sol	L: 0 C: 0
SWC-113	Pass	Multiple calls are executed in the same transaction.	ZKCLPFarm.sol	L: 0 C: 0
SWC-114	Pass	Transaction Order Dependence.	ZKCLPFarm.sol	L: 0 C: 0
SWC-115	Pass	Authorization through tx.origin.	ZKCLPFarm.sol	L: 0 C: 0
SWC-116	Pass	A control flow decision is made based on The block.timestamp environment variable.	ZKCLPFarm.sol	L: 0 C: 0
SWC-117	Pass	Signature Malleability.	ZKCLPFarm.sol	L: 0 C: 0
SWC-118	Pass	Incorrect Constructor Name.	ZKCLPFarm.sol	L: 0 C: 0
SWC-119	Pass	Shadowing State Variables.	ZKCLPFarm.sol	L: 0 C: 0
SWC-120	Low	Potential use of block.number as source of randonmness.	ZKCLPFarm.sol	L: 818 C: 21
SWC-121	Pass	Missing Protection against Signature Replay Attacks.	ZKCLPFarm.sol	L: 0 C: 0
SWC-122	Pass	Lack of Proper Signature Verification.	ZKCLPFarm.sol	L: 0 C: 0
SWC-123	Pass	Requirement Violation.	ZKCLPFarm.sol	L: 0 C: 0
SWC-124	Pass	Write to Arbitrary Storage Location.	ZKCLPFarm.sol	L: 0 C: 0
SWC-125	Pass	Incorrect Inheritance Order.	ZKCLPFarm.sol	L: 0 C: 0

ID	Severity	Name	File	location
SWC-126	Pass	Insufficient Gas Griefing.	ZKCLPFarm.sol	L: 0 C: 0
SWC-127	Pass	Arbitrary Jump with Function Type Variable.	ZKCLPFarm.sol	L: 0 C: 0
SWC-128	Pass	DoS With Block Gas Limit.	ZKCLPFarm.sol	L: 0 C: 0
SWC-129	Pass	Typographical Error.	ZKCLPFarm.sol	L: 0 C: 0
SWC-130	Pass	Right-To-Left-Override control character (U +202E).	ZKCLPFarm.sol	L: 0 C: 0
SWC-131	Pass	Presence of unused variables.	ZKCLPFarm.sol	L: 0 C: 0
SWC-132	Pass	Unexpected Ether balance.	ZKCLPFarm.sol	L: 0 C: 0
SWC-133	Pass	Hash Collisions with Multiple Variable Length Arguments.	ZKCLPFarm.sol	L: 0 C: 0
SWC-134	Pass	Message call with hardcoded gas amount.	ZKCLPFarm.sol	L: 0 C: 0
SWC-135	Pass	Code With No Effects (Irrelevant/Dead Code).	ZKCLPFarm.sol	L: 0 C: 0
SWC-136	Pass	Unencrypted Private Data On-Chain.	ZKCLPFarm.sol	L: 0 C: 0

We scan the contract for additional security issues using MYTHX and industry-standard security scanning tools.

Smart Contract Vulnerability Details

SWC-103 - Floating Pragma.

CWE-664: Improper Control of a Resource Through its Lifetime.

References:

Description:

Contracts should be deployed with the same compiler version and flags that they have been tested with thoroughly. Locking the pragma helps to ensure that contracts do not accidentally get deployed using, for example, an outdated compiler version that might introduce bugs that affect the contract system negatively.

Remediation:

Lock the pragma version and also consider known bugs (https://github.com/ethereum/solidity/releases) for the compiler version that is chosen.

Pragma statements can be allowed to float when a contract is intended for consumption by other developers, as in the case with contracts in a library or EthPM package. Otherwise, the developer would need to manually update the pragma in order to compile locally.

References:

Ethereum Smart Contract Best Practices - Lock pragmas to specific compiler version.

Smart Contract Vulnerability Details

SWC-120 - Weak Sources of Randomness from Chain Attributes

CWE-330: Use of Insufficiently Random Values

Description:

Solidity allows for ambiguous naming of state variables when inheritance is used. Contract A with a variable x could inherit contract B that also has a state variable x defined. This would result in two separate versions of x, one of them being accessed from contract A and the other one from contract B. In more complex contract systems this condition could go unnoticed and subsequently lead to security issues.

Shadowing state variables can also occur within a single contract when there are multiple definitions on the contract and function level.

Remediation:

Using commitment scheme, e.g. RANDAO. Using external sources of randomness via oracles, e.g. Oraclize. Note that this approach requires trusting in oracle, thus it may be reasonable to use multiple oracles. Using Bitcoin block hashes, as they are more expensive to mine.

References:

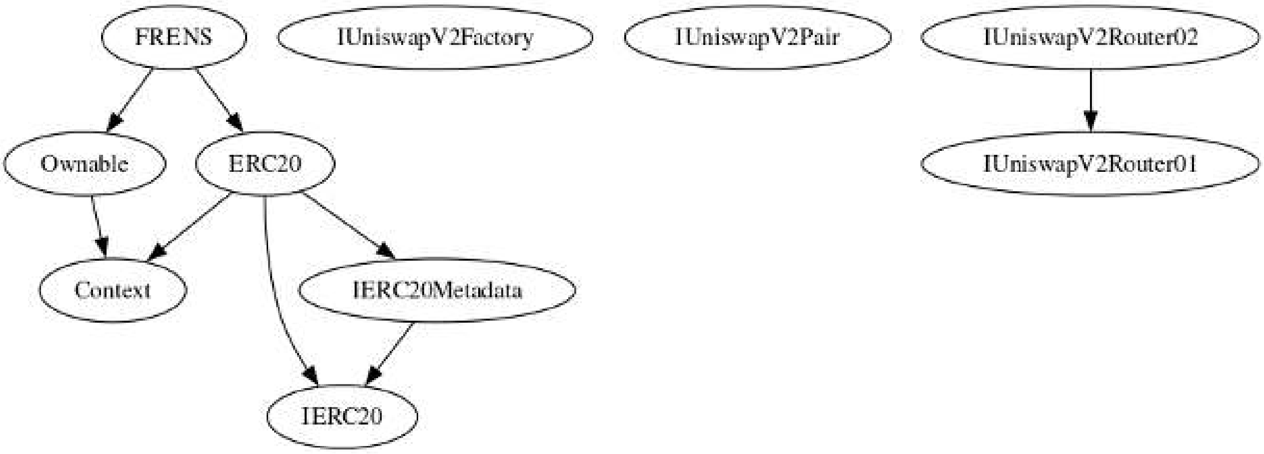
How can I securely generate a random number in my smart contract?)

When can BLOCKHASH be safely used for a random number? When would it be unsafe?

The Run smart contract.

Inheritance

The contract for ZKChain has the following inheritance structure.



Privileged Functions (onlyOwner)

Please Note if the contract is Renounced none of this functions can be executed.

Function Name	Parameters	Visibility
renounceOwnership		Public
transferOwnership	address newOwner	Public
recoverTreasure	IBEP20 recoverToken, uint256 amount	External
addRewardTreasure	uint256 _amount, uint256 _tokenPerBlock	External
setEarlyWithdrawFee	uint256 _earlyFeePercent	External
setMarketingAddress	address _marketingAddress	External

Smart Contract Advance Checks

ID	Severity	Name	Result	Status
Staking-01	Minor	Potential Sandwich Attacks.	Pass	Not-Found
Staking-02	Minor	Function Visibility Optimization	Pass	Not-found
Staking-03	Minor	Lack of Input Validation.	Fail	Pending
Staking-04	Major	Centralized Risk In addLiquidity.	Pass	Not-found
Staking-05	Minor	Missing Event Emission.	Fail	Pending
Staking-06	Minor	Conformance with Solidity Naming Conventions.	Pass	Not-found
Staking-07	Minor	State Variables could be Declared Constant.	Pass	Not-Found
Staking-08	Minor	Dead Code Elimination.	Pass	Not-Found
Staking-09	Major	Third Party Dependencies.	Pass	Not-Found
Staking-10	Major	Initial Token Distribution.	Pass	Not-found
Staking-11	Major	multiTransfer is present within the contract.	Pass	Not-Found
Staking-12	Major	Centralization Risks In The X Role	Pass	Resolved
Staking-13	Informational	Extra Gas Cost For User..	Pass	Not-found
Staking-14	Medium	Unnecessary Use Of SafeMath	Fail	Pending
Staking-15	Medium	Symbol Length Limitation due to Solidity Naming Standards.	Pass	Not-Found

ID	Severity	Name	Result	Status
Staking-16	Medium	Invalid collection of Taxes during Transfer.	Pass	Not-Found
Staking-17	Informational	Conformance to numeric notation best practice.	Pass	Not-Found
Staking-18	Informational	Enable Trade and Exclude Exist to create a whitelist.	Pass	Not-Found

Staking-03 | Lack of Input Validation.

Category	Severity	Location	Status
Volatile Code	Minor	ZKCLPFarm.sol: 849,14	Pending

Description

The given input is missing the check for the non-zero address.

The given input is missing the check for the setMarketingAddress, deposit,withdraw,emergencyWithdraw is missing required function.

Remediation

We advise the client to add the check for the passed-in values to prevent unexpected errors as below:

```
...
 require(receiver != address(0), "Receiver is the zero address");
...
...
require(value X limitation, "Your not able to do this function");
...
```

We also recommend customer to review the following function that is missing a required validation. setMarketingAddress, deposit,withdraw,emergencyWithdraw is missing required function.

Staking-05 | Missing Event Emission.

Category	Severity	Location	Status
Volatile Code	Minor	ZKCLPFarm.sol: 1077, 14	Pending

Description

Detected missing events for critical arithmetic parameters. There are functions that have no event emitted, so it is difficult to track off-chain changes.The linked code does not create an event for the transfer.

Remediation

Emit an event for critical parameter changes. It is recommended emitting events for the sensitive functions that are controlled by centralization roles.

Staking-14 | Unnecessary Use Of SafeMath

Category	Severity	Location	Status
Logical Issue	Medium	ZKCLPFarm.sol: 22,9	Pending

Description

The SafeMath library is used unnecessarily. With Solidity compiler versions 0.8.0 or newer, arithmetic operations
will automatically revert in case of integer overflow or underflow.
library SafeMath {
An implementation of SafeMath library is found.
using SafeMath for uint256;
SafeMath library is used for uint256 type in contract.

```
_balances[recipient] = _balances[recipient].add(amount);
magnifiedDividendPerShare = magnifiedDividendPerShare.add(
    (amount).mul(magnitude) / totalSupply()
);
```

Note: Only a sample of 2 SafeMath library usage in this contract (out of 14) are shown above.

Remediation

We advise removing the usage of SafeMath library and using the built-in arithmetic operations provided by the
Solidity programming language

Project Action

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Technical Findings Summary

Classification of Risk

Severity	Description
Critical	Risks are those that impact the safe functioning of a platform and must be addressed before launch. Users should not invest in any project with outstanding critical risks.
Major	Risks can include centralization issues and logical errors. Under specific circumstances, these major risks can lead to loss of funds and/or control of the project.
Medium	Risks may not pose a direct risk to users' funds, but they can affect the overall functioning of a platform
Minor	Risks can be any of the above but on a smaller scale. They generally do not compromise the overall integrity of the Project, but they may be less efficient than other solutions.
Informational	Errors are often recommended to improve the code's style or certain operations to fall within industry best practices. They usually do not affect the overall functioning of the code.

Findings

Severity	Found	Pending	Resolved
Critical	0	0	0
Major	1	0	0
Medium	0	0	0
Minor	2	0	0
Informational	0	0	0
Total	3	0	0

Social Media Checks

Social Media	URL	Result
Twitter	https://twitter.com/zk_chain	Pass
Other	https://zk-chain.medium.com/	Pass
Website	https://www.zk-chain.org/	Pass
Telegram	https://t.me/ZK_Chain_Group	Pass

We recommend to have 3 or more social media sources including a completed working websites.

Social Media Information Notes:

Auditor Notes: undefined

Project Owner Notes:

Audit Result

Final Audit Score

Review	Score
Security Score	85
Auditor Score	80

The Following Score System Has been Added to this page to help understand the value of the audit, the maximun score is 100, however to attain that value the project most pass and provide all the data needed for the assessment. Our Passing Score has been changed to 80 Points, if a project does not attain 80% is an automatic failure. Read our notes and final assessment below.

Audit Passed

Assessment Results

Important Notes:

- No issues or vulnerabilities were found.
- The contract was tested and is fully functional.
- the following contract has been used for a few staking platforms in the past and is stable, however there are a few coding improvements that can be done.

Auditor Score =80
Audit Passed

Appendix

Finding Categories

Centralization / Privilege

Centralization / Privilege findings refer to either feature logic or implementation of components that actagainst the nature of decentralization, such as explicit ownership or specialized access roles incombination with a mechanism to relocate funds.

Gas Optimization

Gas Optimization findings do not affect the functionality of the code but generate different, more optimalEVM opcodes resulting in a reduction on the total gas cost of a transaction.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on howblock.timestamp works.

Control Flow

Control Flow findings concern the access control imposed on functions, such as owner-only functionsbeing invoke-able by anyone under certain circumstances.

Volatile Code

Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that mayresult in a vulnerability.

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to makethe codebase more legible and, as a result, easily maintainable.

Inconsistency

Inconsistency findings refer to functions that should seemingly behave similarly yet contain different code,such as a constructor assignment imposing different require statements on the input variables than a setterfunction.

Coding Best Practices

ERC 20 Conding Standards are a set of rules that each developer should follow to ensure the code meet a set of creterias and is readable by all the developers.

Disclaimer

CFGNINJA has conducted an independent security assessment to verify the integrity of and highlight any vulnerabilities or errors, intentional or unintentional, that may be present in the reviewed code for the scope of this assessment. This report does not constitute agreement, acceptance, or advocation for the Project, and users relying on this report should not consider this as having any merit for financial advice in any shape, form, or nature. The contracts audited do not account for any economic developments that the Project in question may pursue, and the veracity of the findings thus presented in this report relate solely to the proficiency, competence, aptitude, and discretion of our independent auditors, who make no guarantees nor assurance that the contracts are entirely free of exploits, bugs, vulnerabilities or deprecation of technologies.

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