CFG NINJA AUDITS

Security Assessment

PAYCAT Staking

November 14, 2023

Audit Status: Pass

Audit Edition: Standard

PayCat

POWERED BY

BLADE POOL

Project Overview

Token Summary

Parameter	Result
Address	0xFC914eCB4e4cbEea1Fcf5315129C6cdB398cd465
Name	PAYCAT
Token Tracker	PAYCAT (PCT)
Decimals	9
Supply	100,000,000
Platform	Binance Smart Chain
compiler	v0.8.19+commit.7dd6d404
Contract Name	PAYCAT
Optimization	Yes with 200 runs
LicenseType	MIT
Language	Solidity
Codebase	https://bscscan.com/address/0x31103d5c81a5dfafe72163b3726333180563ea72#code
Payment Tx	Corporate

Main Contract Assessed
Contract Name

Name	Contract	Live
PAYCAT	0xFC914eCB4e4cbEea1Fcf5315129C6cdB398cd465	Yes

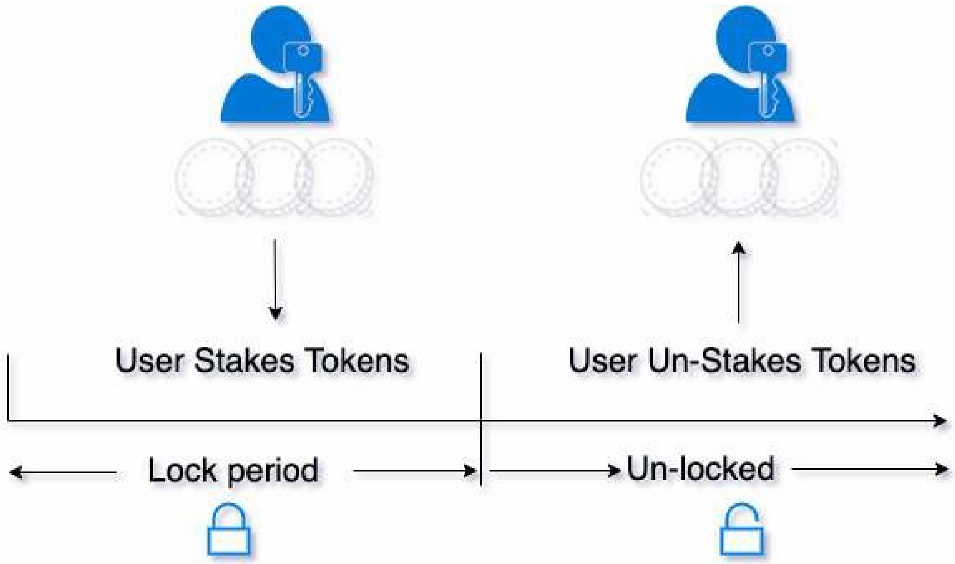
TestNet Contract was Not Assessed

Solidity Code Provided

SolID	File Sha-1	FileName
PCTS	0a8f46830d37cff64e8446835463320a9fd10c39	PayCatStaking.sol

What is a Staking Contract

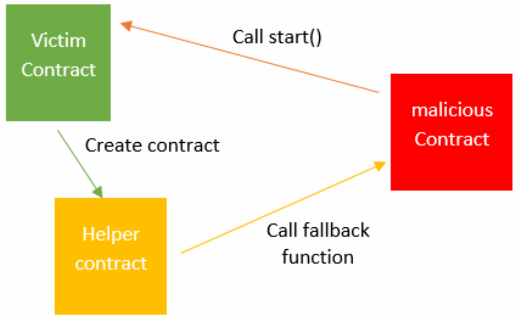
A smart contract which allows users to stake and un-stake a specified ERC20 token. Staked tokens are locked for a specific length of time (set by the contrat owner at the outset). Once the time period has elapsed, the user can remove their tokens again.



The Project Owners of PAYCAT 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



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	PayCatStaking.sol	L: 0 C: 0
SWC-101	Pass	Integer Overflow and Underflow.	PayCatStaking.sol	L: 0 C: 0
SWC-102	Pass	Outdated Compiler Version file.	PayCatStaking.sol	L: 0 C: 0
SWC-103	Fail	A floating pragma is set.	PayCatStaking.sol	L: 2 C: 6
SWC-104	Pass	Unchecked Call Return Value.	PayCatStaking.sol	L: 0 C: 0
SWC-105	Pass	Unprotected Ether Withdrawal.	PayCatStaking.sol	L: 0 C: 0
SWC-106	Pass	Unprotected SELFDESTRUCT Instruction	PayCatStaking.sol	L: 0 C: 0
SWC-107	Pass	Read of persistent state following external call.	PayCatStaking.sol	L: 0 C: 0
SWC-108	Low	State variable visibility is not set..	PayCatStaking.sol	L: 52 C: 15,L: 52 C: 39,L: 52 C: 78,L: 54 C: 31
SWC-109	Pass	Uninitialized Storage Pointer.	PayCatStaking.sol	L: 0 C: 0

ID	Severity	Name	File	location
SWC-110	Pass	Assert Violation.	PayCatStaking.sol	L: 0 C: 0
SWC-111	Pass	Use of Deprecated Solidity Functions.	PayCatStaking.sol	L: 0 C: 0
SWC-112	Pass	Delegate Call to Untrusted Callee.	PayCatStaking.sol	L: 0 C: 0
SWC-113	Pass	Multiple calls are executed in the same transaction.	PayCatStaking.sol	L: 0 C: 0
SWC-114	Pass	Transaction Order Dependence.	PayCatStaking.sol	L: 0 C: 0
SWC-115	Pass	Authorization through tx.origin.	PayCatStaking.sol	L: 0 C: 0
SWC-116	Pass	A control flow decision is made based on The block.timestamp environment variable.	PayCatStaking.sol	L: 0 C: 0
SWC-117	Pass	Signature Malleability.	PayCatStaking.sol	L: 0 C: 0
SWC-118	Pass	Incorrect Constructor Name.	PayCatStaking.sol	L: 0 C: 0
SWC-119	Pass	Shadowing State Variables.	PayCatStaking.sol	L: 0 C: 0
SWC-120	Pass	Potential use of block.number as source of randonmness.	PayCatStaking.sol	L: 0 C: 0
SWC-121	Pass	Missing Protection against Signature Replay Attacks.	PayCatStaking.sol	L: 0 C: 0
SWC-122	Pass	Lack of Proper Signature Verification.	PayCatStaking.sol	L: 0 C: 0
SWC-123	Pass	Requirement Violation.	PayCatStaking.sol	L: 0 C: 0
SWC-124	Pass	Write to Arbitrary Storage Location.	PayCatStaking.sol	L: 0 C: 0

ID	Severity	Name	File	location
SWC-125	Pass	Incorrect Inheritance Order.	PayCatStaking.sol	L: 0 C: 0
SWC-126	Pass	Insufficient Gas Griefing.	PayCatStaking.sol	L: 0 C: 0
SWC-127	Pass	Arbitrary Jump with Function Type Variable.	PayCatStaking.sol	L: 0 C: 0
SWC-128	Pass	DoS With Block Gas Limit.	PayCatStaking.sol	L: 0 C: 0
SWC-129	Pass	Typographical Error.	PayCatStaking.sol	L: 0 C: 0
SWC-130	Pass	Right-To-Left-Override control character (U +202E).	PayCatStaking.sol	L: 0 C: 0
SWC-131	Pass	Presence of unused variables.	PayCatStaking.sol	L: 0 C: 0
SWC-132	Pass	Unexpected Ether balance.	PayCatStaking.sol	L: 0 C: 0
SWC-133	Pass	Hash Collisions with Multiple Variable Length Arguments.	PayCatStaking.sol	L: 0 C: 0
SWC-134	Pass	Message call with hardcoded gas amount.	PayCatStaking.sol	L: 0 C: 0
SWC-135	Pass	Code With No Effects (Irrelevant/Dead Code).	PayCatStaking.sol	L: 0 C: 0
SWC-136	Pass	Unencrypted Private Data On-Chain.	PayCatStaking.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-108 - State Variable Default Visibility

CWE-710: Improper Adherence to Coding Standards

Description:

Labeling the visibility explicitly makes it easier to catch incorrect assumptions about who can access the variable.

Remediation:

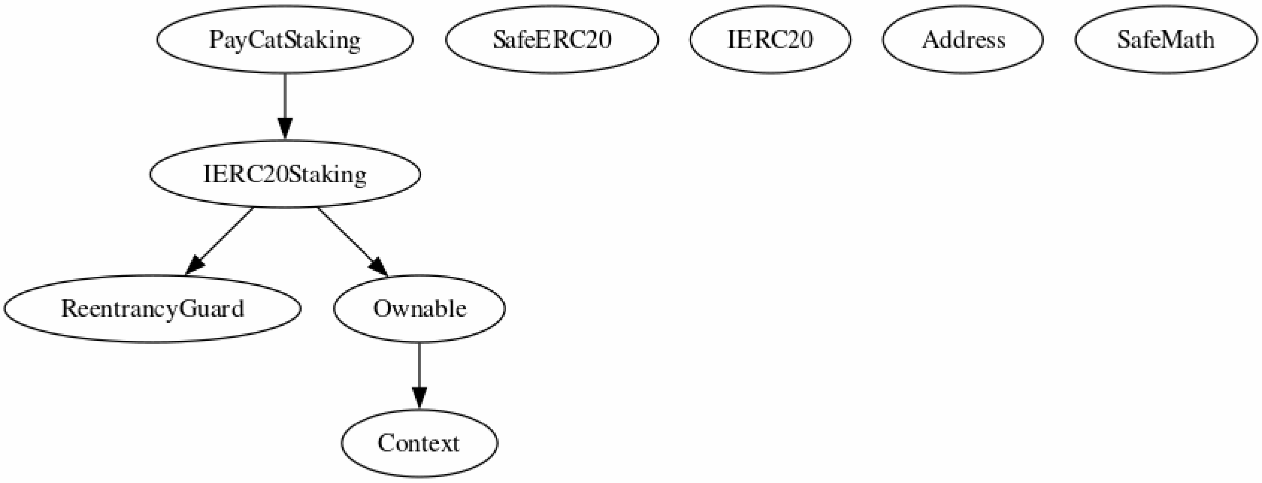
Variables can be specified as being public, internal or private. Explicitly define visibility for all state variables.

References:

Ethereum Smart Contract Best Practices - Explicitly mark visibility in functions and state variables

Inheritance

The contract for PAYCAT has the following inheritance structure.



Smart Contract Advance Checks

ID	Severity	Name	Result	Status
PCT-01	Low	Potential Sandwich Attacks.	Pass	Not Detected
PCT-02	Informational	Function Visibility Optimization	Fail	Detected
PCT-03	Low	Lack of Input Validation.	Fail	Detected
PCT-04	High	Centralized Risk In addLiquidity.	Pass	Not Detected
PCT-05	Low	Missing Event Emission.	Fail	Detected
PCT-06	Low	Conformance with Solidity Naming Conventions.	Pass	Detected
PCT-07	Low	State Variables could be Declared Constant.	Pass	Not Detected
PCT-08	Low	Dead Code Elimination.	Pass	Not Detected
PCT-09	High	Third Party Dependencies.	Pass	Not Detected
PCT-10	High	Initial Token Distribution.	Pass	Not Detected
PCT-11	High	onlyDev configured as hidden owner.	Pass	Not Detected
PCT-12	High	Centralization Risks In The X Role	Pass	Not Detected
PCT-13	Informational	Extra Gas Cost For User..	Pass	Not Detected
PCT-14	Medium	Unnecessary Use Of SafeMath	Fail	Detected
PCT-15	Medium	Symbol Length Limitation due to Solidity Naming Standards.	Pass	Not Detected

ID	Severity	Name	Result	Status
PCT-16	Medium	Taxes can be up to 100%	Pass	Not Detected
PCT-17	Logical Issue	Highly Permissive Role Access.,`	Pass	Not Detected
PCT-18	Critical	Stop Transactions by using Enable Trade.	Pass	Not Detected

PCT-02 | Function Visibility Optimization.

Category	Severity	Location	Status
Gas Optimization	ℹ Informational	PayCatStaking.sol: L: 52 C: 13, L: 53 C: 13,L: 54 C: 13,L: 55 C: 13	Detected

Description

The following functions are declared as public and are not invoked in any of the contracts contained within the projects scope:

Function Name	Parameters	Visibility
minAPR		internal
maxDepositDeduction		internal
maxWithdrawDeduction		internal
maxEarlyPenalty		internal

The functions that are never called internally within the contract should have external visibility

Remediation

We advise that the function's visibility specifiers are set to external, and the array-based arguments change their data location from memory to calldata, optimizing the gas cost of the function.

References:

external vs public best practices.

PCT-03 | Lack of Input Validation.

Category	Severity	Location	Status
Volatile Code	● Low	PayCatStaking.sol: L: 278 C: 14	Detected

Description

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

The given input is missing the check for the setStakeConclude need to be corrected..

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. setStakeConclude need to be corrected..

PCT-05 | Missing Event Emission.

Category	Severity	Location	Status
Volatile Code	🟢 Low	PayCatStaking.sol: L: 274 C: 14, L: 273 C: 14, L: 268 C: 14, L: 263 C: 14, L: 258 C: 14, L: 229 C: 14, L: 152 C: 14, L: 77 C: 14	Detected

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.

PCT-14 | Unnecessary Use Of SafeMath

Category	Severity	Location	Status
Logical Issue	🟡 Medium	PayCatStaking.sol: L: 47 C: 14	Detected

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.

Remediation

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

Solidity programming language

Project Action

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.
🟠 High	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
🟢 Low	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.
ℹ 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
🟠 High	0	0	0
🟡 Medium	1	0	0
🟢 Low	2	0	0
ℹ Informational	1	0	0
Total	4	0	0

Social Media Checks

Social Media	URL	Result
Twitter	https://twitter.com/payCat_official	Pass
Other		Fail
Website	https://paycat.io	Pass
Telegram	https://t.me/paycat_to_the_moon	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	90
Auditor Score	90

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:

- The following contract is clean.
- It could use some improvements as noted in the audit.
- This is a Staking Contract for ERC20 Token.

Auditor Score =90
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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