VITAL BLOCK

Security Assessment

SUIHEROES

Vital Block Verified on May 9th, 2023

@Vital-Block

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PREPARED FOR:

SUIHEROES

INTRODUCTION

Auditing Firm	**VITAL BLOCK SECURITY**
Client Firm	**SUIHEROES**
Methodology	**Automated Analysis, Manual Code Review**
Language	**.Move**
Blockchain	**Sui Blockchain**
Centralization	**Active ownership**
Contract	**0x4d6385ad94a382a04b1d9cb3ff83c9728c2c43546853bc2b914be90bafb7bb91**
Code	**Suiheroes.Move**
Website	**https://suiheroes-testnet.netlify.app/**
Discord	**https://dsc.gg/suiheroes**
Twitter	**https://twitter.com/Sui_start**
Medium	**https://medium.com/@suiheroes**
Doc	**https://sui-heroes.gitbook.io/sui-heroes/**
Prelim Report Date	**May 9TH , 2023**
Final Report Date	**May 9th , 2023**

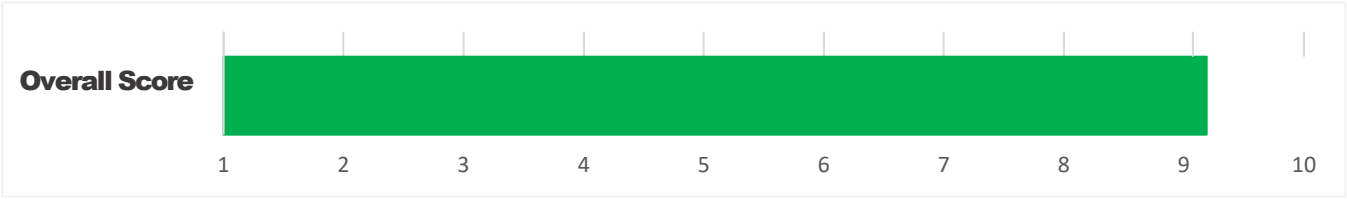
Verify the authenticity of this report on our GitHub Repo: https://www.github.com/vital-block

EXECUTIVE SUMMARY

Vital Block has performed the automated and manual analysis of the Move code. The code was reviewed for common contract vulnerabilities and centralized exploits. Here's a quick audit summary:

Status	Critical ! 🔴	Major " 🟠	Medium # 🟡	Minor $ 🟢	Unknown % 🟤
Open	0	0	0	2	0
Acknowledged	0	0	1	2	0
Resolved	0	0	0	0	0
Noteworty OnlyOwner Privileges.	Set Taxes and Ratios, Airdrop, Set Protection Settings, Set Reward Properties, Set Reflector Settings, Set Swap Settings, Set Pair and Router				

SUIHEROES smart contract has achieved the following score: 9.5



ℹ️ **Please note that smart contracts deployed on blockchains aren't resistant to exploits, vulnerabilities and/or hacks. Blockchain and cryptography assets utilize new and emerging technologies. These technologies present a high level of ongoing risks. For a detailed understanding of risk severity, source code vulnerability, and audit limitations, kindly review the audit report thoroughly.**

ℹ️ **Please note that centralization privileges regardless of their inherited risk status - constitute an elevated impact on smart contract safety and security.**

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SCOPE OF WORK

Vital Block was consulted by SUIHEROES to conduct the smart contract audit of its MOVE source code. The audit scope of work is strictly limited to mentioned MOVE file only:

- **SUIHEROES.Move**

External contracts and/or interfaces dependencies are not checked due to being out of scope.

Verify audited contract's contract address and deployed link below:

Public Contract	
0x4d6385ad94a382a04b1d9cb3ff83c9728c2c43546853bc2b914be90bafb7bb91	
Contract Name	**SUIHEROES**
Token Symbol	**SHS**
MAX Supply	**10,000,000,000**
Decimals	**9**

AUDIT METHODOLOGY

Smart contract audits are conducted using a set of standards and procedures. Mutual collaboration is essential to performing an effective smart contract audit. Here's a brief overview of Vital Block auditing process and methodology:

CONNECT

- **The onboarding team gathers source codes, and specifications to make sure we understand the size, and scope of the smart contract audit.**

AUDIT

- **Automated analysis is performed to identify common contract vulnerabilities. We may use the following third-party frameworks and dependencies to perform the automated analysis:**
  - **Remix IDE Developer Tool**
  - **Open Zeppelin Code Analyzer**
  - **SWC Vulnerabilities Registry**
  - **Visual Studio Code**
  - **DEX Dependencies, e.g., Pancakeswap, Liquidswap**
- **Simulations are performed to identify centralized exploits causing contract and/or trade locks.**
- **A manual line-by-line analysis is performed to identify contract issues and centralized privileges. We may inspect below mentioned common contract vulnerabilities, and centralized exploits:**

Centralized Exploits	○ **Token Supply Manipulation** ○ **Access Control and Authorization** ○ **Assets Manipulation** ○ **Ownership Control** ○ **Liquidity Access** ○ **Stop and Pause Trading** ○ **Ownable Library Verification**

Common Contract Vulnerabilities	○ Integer Overflow ○ Lack of Arbitrary limits ○ Incorrect Inheritance Order ○ Typographical Errors ○ Requirement Violation ○ Gas Optimization ○ Coding Style Violations ○ Re-entrancy ○ Third-Party Dependencies ○ Potential Sandwich Attacks ○ Irrelevant Codes ○ Divide before multiply ○ Conformance to Solidity Naming Guides ○ Compiler Specific Warnings ○ Language Specific Warnings

REPORT

- The auditing team provides a preliminary report specifying all the checks which have been performed and the findings thereof.
- The client's development team reviews the report and makes amendments to the codes.
- The auditing team provides the final comprehensive report with open and unresolved issues.

PUBLISH

- The client may use the audit report internally or disclose its publicly.

ℹ️ It is important to note that there is no pass or fail in the audit, it is recommended to view the audit

as an unbiased assessment of the safety of solidity codes.

RISK CATEGORIES

Smart contracts are generally designed to hold, approve, and transfer tokens. This makes them very tempting attack targets. A successful external attack may allow the external attacker to directly exploit. A successful centralization-related exploit may allow the privileged role to directly exploit. All risks which are identified in the audit report are categorized here for the reader to review:

Risk Type	Definition
Critical !	These risks could be exploited easily and can lead to asset loss, data loss, asset, or data manipulation. They should be fixed right away.
Major "	These risks are hard to exploit but very important to fix, they carry an elevated risk of smart contract manipulation, which can lead to high-risk severity.
Medium #	These risks should be fixed, as they carry an inherent risk of future exploits, and hacks which may or may not impact the smart contract execution. Low-risk re-entrancy-related vulnerabilities should be fixed to deter exploits.
Minor $	These risks do not pose a considerable risk to the contract or those who interact with it. They are code-style violations and deviations from standard practices. They should be highlighted and fixed nonetheless.
Unknown %	These risks pose uncertain severity to the contract or those who interact with it. They should be fixed immediately to mitigate the risk uncertainty.

All statuses which are identified in the audit report are categorized here for the reader to review:

Status Type	Definition
Open	Risks are open.
Acknowledged	Risks are acknowledged, but not fixed.
Resolved	Risks are acknowledged and fixed.

CENTRALIZED PRIVILEGES

Centralization risk is the most common cause of cryptography asset loss. When a smart contract has a privileged role, the risk related to centralization is elevated.

There are some well-intended reasons have privileged roles, such as:

- **Privileged roles can be granted the power to** pause() **the contract in case of an external attack.**
- **Privileged roles can use functions like,** include(), **and** exclude() **to add or remove wallets from fees, swap checks, and transaction limits. This is useful to run a presale and to list on an exchange.**

Authorizing privileged roles to externally-owned-account (EOA) is dangerous. Lately, centralization-related losses are increasing in frequency and magnitude.

- **The client can lower centralization-related risks by implementing below mentioned practices:**
- **Privileged role's private key must be carefully secured to avoid any potential hack.**
- **Privileged role should be shared by multi-signature (multi-sig) wallets.**
- **Authorized privilege can be locked in a contract, user voting, or community DAO can be introduced to unlock the privilege.**
- **Renouncing the contract ownership, and privileged roles.**
- **Remove functions with elevated centralization risk.**

Understand the project's initial asset distribution. Assets in the liquidity pair should be locked. Assets outside the liquidity pair should be locked with a release schedule.

AUTOMATED ANALYSIS

Symbol	Definition
	Function modifies state
	Function is payable
	Function is internal
	Function is private
	Function is important

**SUIHEROES **	Interface			
└	totalSupply	External			NO	
└	decimals	External			NO	
└	symbol	External			NO	
└	name	External			NO	
└	getOwner	External			NO	
└	minting	External			NO	
└	Burning Capabilities	External			NO	
"
└	allowance	External			NO	
└	approve	External	"		NO	
└	transferFrom	External		"	NO	
IFactoryV2	Interface			
└	getPair	External			NO	
└	createPair	External		"	NO	
IV2Pair	Interface			
└	factory	External			NO	
└	getReserves	External			NO	
└	Freezing Capabilities	External		"	NO

IRouter01	Interface		
└	factory	External ❗	NO❗
└	**SUI**	External ❗	NO❗
└	addLiquiditySUI	External ❗	# NO❗
└	addLiquidity	External ❗	" NO❗
└	swapExactAPTForTokens	External ❗	# NO❗
└	getAmountsOut	External ❗	NO❗
└	getAmountsIn	External ❗	NO❗
IRouter02	Interface	IRouter01	
└	swapExactTokensForSUISupportingFeeOnTransferTokens	External ❗	" NO❗
└	swapExactSUIForTokensSupportingFeeOnTransferTokens	External ❗	# NO❗
└	swapExactTokensForTokensSupportingFeeOnTransferTokens	External ❗	" ! 🛑 NO❗
└	swapExactTokensForTokens	External ❗	" NO❗
Protections	Interface		
└	checkUser	External ❗	" ! 🛑 NO❗
└	setLaunch	External ❗	" NO❗
└	setLpPair	External ❗	" NO❗
└	**SUI**	External ❗	" NO❗
└	removeSniper	External ❗	" NO❗
Cashier	Interface		
└	setRewardsProperties	External ❗	" NO❗
└	tally	External ❗	" NO❗
└	load	External ❗	# NO❗
└	cashout	External ❗	" NO❗
└	giveMeWelfarePlease	External ❗	" NO❗
└	getTotalDistributed	External ❗	NO❗
└	getUserInfo	External ❗	NO❗
└	getUserRealizedRewards	External ❗	NO❗

| └ | getPendingRewards | External ❗ | | NO❗ |

| └ | initialize | External ❗ | " | NO❗ |

| └ | getCurrentReward | External ❗ | | NO❗ |

||||||

| **MOVE** | Implementation | **toml** |||

| └ | <Constructor> | Public ❗ | | # | NO❗ |

| └ | transferOwner | External ❗ | " | | onlyOwner |

| └ | renounceOwnership | External ❗ | " | | NO❗|

| └ | setOperator | Public ❗ | " | NO❗ |

| └ | renounceOriginalDeployer | External ❗ | " | NO❗ |

| └ | <Receive Ether> | External ❗ | | # | NO❗ |

| └ | totalSupply | External ❗ | | NO❗ |

| └ | decimals | External ❗ | | NO❗ |

| └ | symbol | External ❗ | | NO❗ |

| └ | name | External ❗ | | NO❗ |

| └ | getOwner | External ❗ | ❗ | NO❗ |

| └ | balanceOf | Public ❗ | ❗ | NO❗ |

| └ | allowance | External ❗ | ❗ | NO❗ |

| └ | approve | External ❗ | " ❗ 🛑 | NO❗ |

| └ | _approve | Internal $ | " | | |

| └ | approveContractContingency | Public ❗ | " ❗ 🛑 | onlyOwner |

| └ | transfer | External ❗ | " | NO❗ |

| └ | transferFrom | External ❗ | " | NO❗ |

| └ | setNewRouter | External ❗ | " | onlyOwner |

| └ | setLpPair | External ❗ | " | onlyOwner |

| └ | setInitializers | External ❗ | " | onlyOwner |

| └ | isExcludedFromFees | External ❗ | | NO❗ |

| └ | isExcludedFromDividends | External ❗ | | NO❗ |

| └ | isExcludedFromProtection | External ❗ | | NO❗ |

| └ | setDividendExcluded | Public ❗ | " | onlyOwner |

| └ | setExcludedFromFees | Public ❗ | " | onlyOwner |

General Detectors

Public Functions Should be Declared External

Some functions in this contract should be declared as external in order to save gas.

Attention Required

Numeric Notation Best Practices

The numeric notation used in this contract is unconventional, possibly worsening the reading/debugging experience

Attention Required

- No compiler version inconsistencies found
- No unchecked call responses found
- No vulnerable self-destruct functions found
- No assertion vulnerabilities found
- No old solidity code found
- No external delegated calls found
- No external call dependency found
- No vulnerable authentication calls found
- No invalid character typos found
- No RTL characters found
- No dead code found
- No risky data allocation found
- No uninitialized state variables found
- No uninitialized storage variables found
- No vulnerable initialization functions found
- No risky data handling found
- No number accuracy bug found
- No out-of-range number vulnerability found
- No map data deletion vulnerabilities found
- No tautologies or contradictions found
- No faulty true/false values found
- No innacurate divisions found
- No redundant constructor calls found
- No vulnerable transfers found
- No vulnerable return values found
- No uninitialized local variables found
- No default function responses found
- No missing arithmetic events found
- No missing access control events found
- No redundant true/false comparisons found
- No state variables vulnerable through function calls found
- No buggy low-level calls found
- No expensive loops found
- No bad numeric notation practices found
- No missing constant declarations found
- No missing external function declarations found
- No vulnerable payable functions found
- No vulnerable message values found

Repository:

https://github.com/SuiHeroes

All Audited Files

SUIHEROES.Move

Contract Creator

0xa72c7b4a20f553c581cfcac3b9a06020d13448c27892c6109971a2fa7144c296

Creator Tnx Hash

0x4d6385ad94a382a04b1d9cb3ff83c9728c2c43546853bc2b914be90bafb7bb91

Contracts:

```
Contract TOKEN:
0x4d6385ad94a382a04b1d9cb3ff83c9728c2c43546853bc2b914be90bafb7bb91
```

Vulnerability Scan

REENTRANCY

Severity	Major
Confidence Parameter	Certain

Vulnerability Description

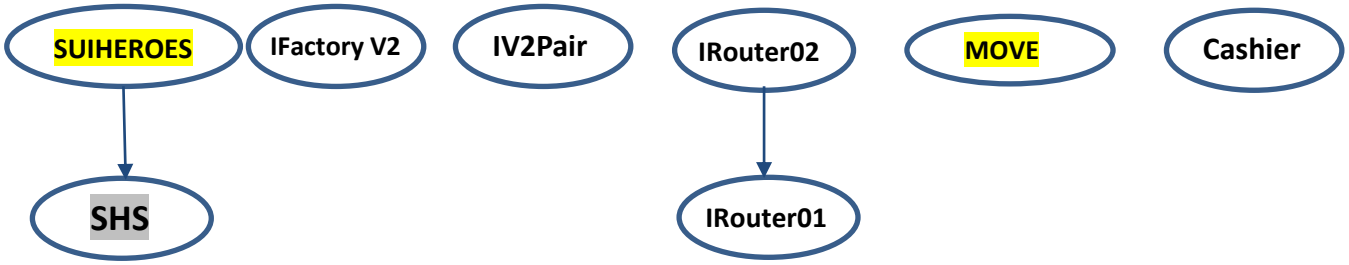
NOTE: In a re-entrance attack, a malicious contract calls back into the calling contract before the first invocation of the function is finished. This may cause the different invocations of the function to interact in undesirable ways, especially in cases where the function is updating state variables after the external calls.

Scanning Line:

```
  fun init(witness: SUIHEROES, ctx: &mut TxContext){
        let (treasury_cap, metadata) =
coin::create_currency<SUIHEROES>(witness, Decimals, Symbol,
Name, Description, option::none(), ctx);
        transfer::public_freeze_object(metadata);
        transfer::public_transfer(coin::mint(&mut treasury_cap,
TOTAL_SUPPLY_SHS_DECIMALS, ctx), tx_context::sender(ctx));
        transfer::public_transfer(treasury_cap,
tx_context::sender(ctx))
    }

    public entry fun transfer(c: coin::Coin<SUIHEROES>,
recipient: address){
        transfer::public_transfer(c, recipient)
    }
```

INHERITANCE GRAPH



Identifier	Definition	Severity
CEN-12	Centralization privileges of SUIHEROES	Medium #

Vulnerability 0 : No important security issue detected.
Threat level: Low

```
struct SUIHEROES has drop {}

const Decimals : u8 = 9;
const Symbol : vector<u8> = b"SHS";
const Name : vector<u8> = b"Suiheroes";
const Description : vector<u8> = b"Suiheroes project utility tokens. It will be used in the further games";

const TOTAL_SUPPLY_SHS : u64 = 10_000_000_000;

const TOTAL_SUPPLY_SHS_DECIMALS : u64 = 10_000_000_000_000_000_000;

fun init(witness: SUIHEROES, ctx: &mut TxContext){
    let (treasury_cap, metadata) = coin::create_currency<SUIHEROES>(witness, Decimals, Symbol, Name, Description, option::none(), ctx
    transfer::public_freeze_object(metadata);
    transfer::public_transfer(coin::mint(&mut treasury_cap, TOTAL_SUPPLY_SHS_DECIMALS, ctx), tx_context::sender(ctx));
    transfer::public_transfer(treasury_cap, tx_context::sender(ctx))
}

public entry fun transfer(c: coin::Coin<SUIHEROES>, recipient: address){
    transfer::public_transfer(c, recipient)
}
```

listen on all transactions Search with transaction hash or address

MANUAL REVIEW

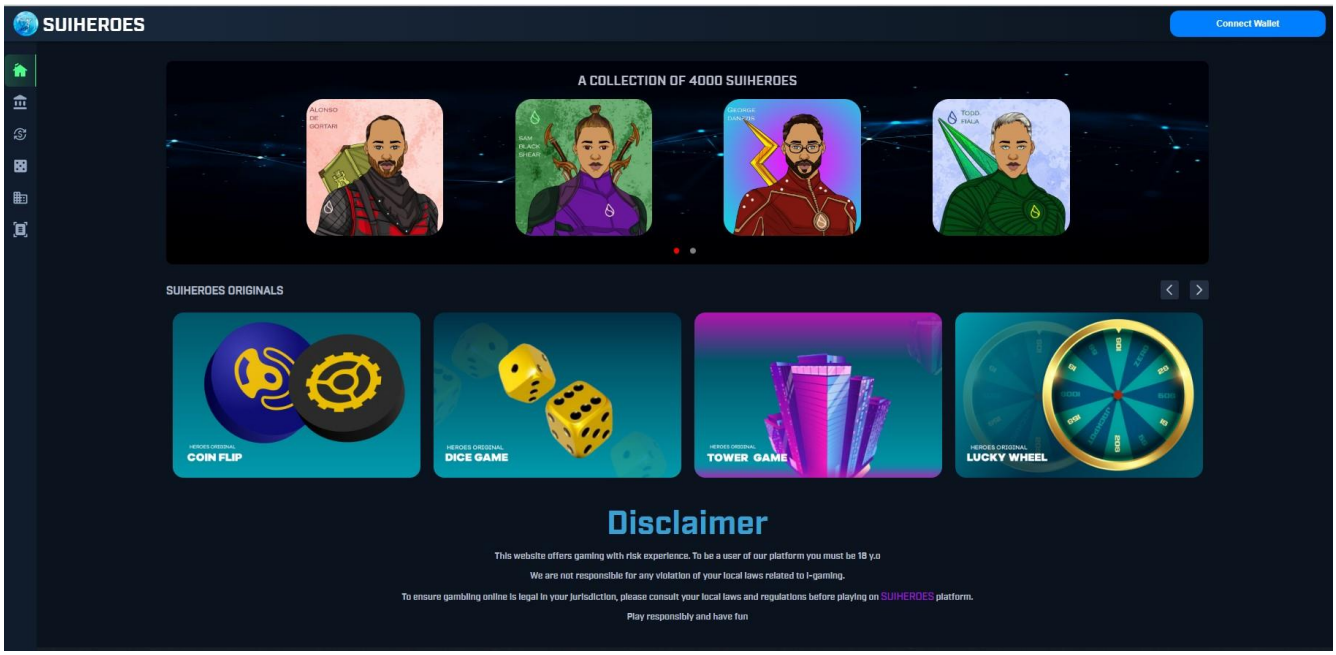
SUIHEROES: SUI Heroes offers a number of wagering games to players and is constantly developing new experiences to meet the demands of our player base. Currently, we are developing Coin Flip and other types of wagering Games that utilize a player-vs-player matching system and a DAO to ensure our community is always at the forefront of any decision making.

TOKEN NAME: SUIHEROES
Ticker: SHS

Chain/Standard: SUI Blockchain

Total Supply: 10,000,000,000

Outstanding Features Of SUIHEROES is Launching On The SUI chain



ISSUES CHECKING STATUS

	Issue Description	Checking Status
1.	Compiler errors.	PASSED
2.	Race Conditions and reentrancy. Cross-Function Race Conditions.	PASSED
3.	Possible Delay In Data Delivery.	PASSED
4.	Oracle calls.	PASSED
5.	Front Running.	PASSED
6.	Move Dependency.	PASSED
7.	Integer Overflow And Underflow.	PASSED
8.	DoS with Revert.	PASSED
9.	Dos With Block Gas Limit.	PASSED
10.	Methods execution permissions.	PASSED
11.	Economy Model of the contract.	PASSED
12.	The Impact Of Exchange Rate On the Move Logic.	PASSED
13.	Private use data leaks.	PASSED
14.	Malicious Event log.	PASSED
15.	Scoping and Declarations.	PASSED
16.	Uninitialized storage pointers.	PASSED
17.	Arithmetic accuracy.	PASSED
18.	Design Logic.	PASSED
19.	Cross-Function race Conditions	PASSED
20.	Save Upon Move contract Implementation and Usage.	PASSED
21.	Fallback Function Security	PASSED

AUDIT RESULT

PASSED

SMART CONTRACT AUDIT OF SUIHEROES

Identifier	Definition	Severity
CEN-02	Initial asset distribution	Minor

All of the initially minted assets are sent to the contract deployer when deploying the contract..

```
module suiheroes::suiheroes{    use std::option;
 use      ::coin::{Self, Coin, TreasuryCap};
use      ::transfer;
use      ::tx_context::{Self, TxContext};
struct SUIHEROES has drop {}    const Decimals : u8 = 9;
const Symbol : vector<u8> = b"SHS";
const Name : vector<u8> = b"Suiheroes";
```

RECOMMENDATION

Project stakeholders should be consulted during the initial asset distribution process.

RECOMMENDATION

Deployer and/or contract owner private keys are secured carefully.

Please refer to PAGE-09 CENTRALIZED PRIVILEGES for a detailed understanding.

ALLEVIATION

SUIHEROES project team understands the centralization risk. Some functions are provided privileged access to ensure a good runtime behaviour in the project

CERTIFICATE BY VITAL BLOCK SECURITY

Identifier	Definition	Severity
COD-10	Third Party Dependencies	Minor

Smart contract is interacting with third party protocols e.g., Pancakeswap router, cashier contract, protections contract. The scope of the audit treats third party entities as black boxes and assumes their functional correctness. However, in the real world, third parties can be compromised, and exploited. Moreover, upgrades in third parties can create severe impacts, e.g., increased transactional fees, deprecation of previous routers, etc.

RECOMMENDATION

Inspect and validate third party dependencies regularly, and mitigate severe impacts whenever necessary.

DISCLAIMERS

Vital Block Security provides the easy-to-understand audit of Solidity, Move and Raw source codes (commonly known as smart contracts).

The smart contract for this particular audit was analyzed for common contract vulnerabilities, and centralization exploits. This audit report makes no statements or warranties on the security of the code. This audit report does not provide any warranty or guarantee regarding the absolute bug-free nature of the smart contract analyzed, nor do they provide any indication of the client's business, business model or legal compliance. This audit report does not extend to the compiler layer, any other areas beyond the programming language, or other programming aspects that could present security risks. Cryptographic tokens are emergent technologies, they carry high levels of technical risks and uncertainty. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. This audit report could include false positives, false negatives, and other unpredictable results.

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Vital Block is Dedicated to Making Defi & Web3 A Safer Place. We are Powered by Security engineers, developers, UI experts, and blockchain enthusiasts. Our team currently consists of 5 core members, and 4+ casual contributors.

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