



SMART CONTRACT AUDIT

 @Vital-Block

 @VB_Audit

 info@vitalblock.org

 www.vitalblock.org



PREPARED FOR:
MUN BLOCKCHAIN



INTRODUCTION

Auditing Firm	VITAL BLOCK SECURITY
Client Firm	MUN BLOCKCHAIN
Methodology	Automated Analysis, Manual Code Review
CODEBASE	https://github.com/munblockchain/mun
Default Node ID	034742613c9c7c1106c79014cc12f91df05d7984
Blockchain	Mun Blockchain
language	Golang
Code Base	GitHub Repository
Website	https://mun.money
Discord	https://dsc.gg/munmoney
Twitter	https://twitter.com/munblockchain
GitHub	https://github.com/munblockchain
Prelim Report Date	December 12, 2022
Final Report Date	December 13, 2022








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 Mun Blockchain 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	1	0
Acknowledged	0	0	0	2	0
Resolved	0	0	0	0	0
<div> <div>The main types and scope of security audits include:</div> <div>Encoding security, RPC security, P2P security, Consensus security, Account system security, Contract virtual machine security, Business logic design security</div> </div>					

MUN BLOCKCHAIN Public Blockchain has achieved the following score: **10**.



 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.

 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 MUN BLOCKCHAIN to conduct the smart contract audit of its MUN source code. The audit scope of work is strictly limited to mentioned Source code file only:

O MUN BLOCKCHAIN

 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:

Default Node ID	
034742613c9c7c1106c79014cc12f91df05d7984	
BLOCKCHAIN NAME	MUN BLOCKCHAIN
NET WORK	MUN
MONIKER	ALPHA-PHOENIX-SUN
PLATFORM	Cosmos SDK



AUDIT METHODOLOGY

Blockchain 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**
 - **DEX Dependencies, e.g., Pancakeswap, Uniswap**
- **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	<ul style="list-style-type: none">○ 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 it publicly.**

 **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

Blockchain and 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 Blockchain or 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.

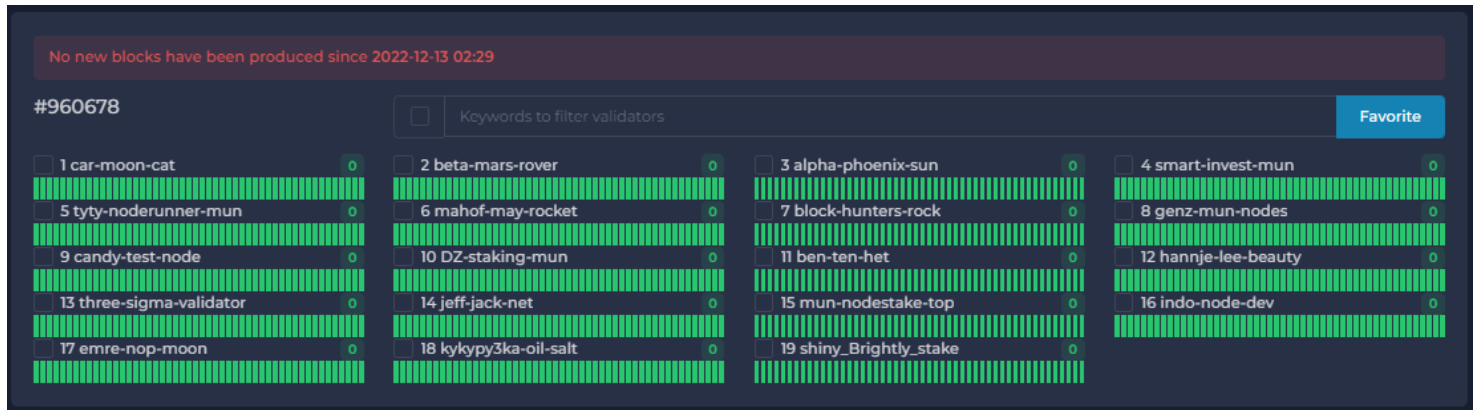
- **The client can lower centralization-related risks by implementing below mentioned practices:**
- **Privileged role's private key must be carefully secured to avoid any potential hack.**
- **Privileged roles should be shared by multi-signature (multi-sig) wallets.**
- **Authorized privilege can be 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.**

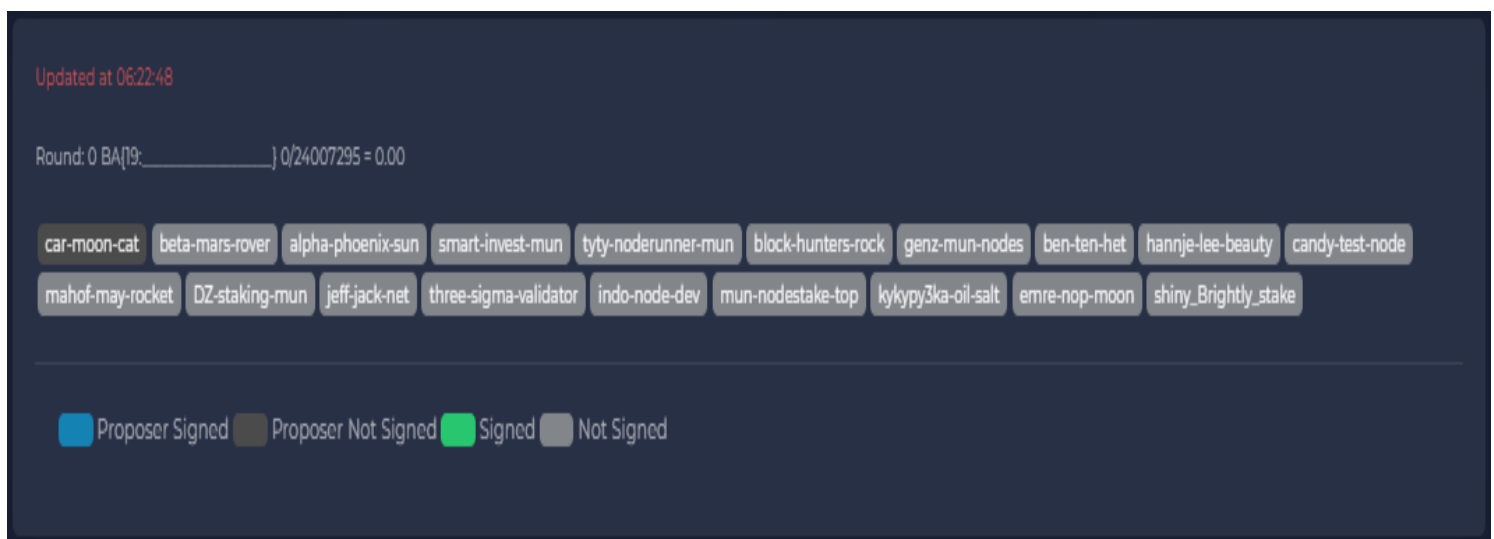


BLOCK EXPLORER RUNS

UPTIME:



Consensus State



*This tool is useful for validators to monitor who is onboard during an upgrade

*If you want to change the default rpc endpoint. make sure that "https" and "CORS" are enabled on your server.



CHAIN PARAMETERS

Staking Parameters

7

Max_entries

10000

Historical_entries

1814400

Unbonding_time

150

Max_validators

utmun

Bond_denom

Slashing Parameters

100

Signed_blocks_window

50%

Min_signed_per_window

600

Downtime_jail_duration

5%

Slash_fraction_double_sign

1%

Slash_fraction_downtime

Minting Parameters

utmun

Mint_denom

13%

Inflation_rate_change

20%

Inflation_max

7%

Inflation_min

67%

Goal_bonded

6311520

Blocks_per_year

Slashing Parameters

100

Signed_blocks_window

50%

Min_signed_per_window

600

Downtime_jail_duration

5%



Slash_fraction_double_sign

1%

Slash_fraction_downtime



AUTOMATED ANALYSIS

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

```

| **.GO** | Interface |      | | |
|  | Mclock | External  |      !      |NO  |
|  | decimals | External  |      !      |NO  |
|  | symbol | External  |      !      |NO  |
|  | testdata | External  |      !      |NO  |
|  | keystone | External  |      |NO  |
|  | reward time | External  |      !      |NO!  |
|  | accounts | External  | "      !      |NO!  |
|  | ab | External  |      !      |NO!  |
|  | backends | External  | "      !      |NO!  |
|  | binds | External  | "      !      |NO!  |
|||||
| **CMD** | Interface |      |
|  | abigen | External  |      !      |NO!  |
|  | bootnode | External  | "      !      |NO!  |
|||||
| **VALIDATOR** | Interface |      |
|  | clef | External  |      !      |NO!  |
|  | docs | External  |      !      |NO!  |
|  | sync | External  | "      !      |NO!  |

```



|||||

```

| **IV** | Interface |      ||| |
|  ^  | qubes | External  |  !  |NO! |
|  ^  | cphclient | External  |NO! |
|  ^  | cphkey | External  |  !  |#s|NO! |
|  ^  | cypher | External  | "  !  |NO! |
|  ^  | EVM | External  |  !  |#s|NO! |
|  ^  | internal | External  |  !  |NO! |
|  ^  | compiler | External  |  !  |NO! |

```

|||||

```

| **FAUCET** | Interface | IRouter01 ||| |
|  ^  | swapExactTokensForAPTSupportingFeeOnTransferTokens | External  | "  !  |NO! |
|  ^  | swapExactAPTForTokensSupportingFeeOnTransferTokens | External  |  !  |#s|NO! |
|  ^  | swapExactTokensForTokensSupportingFeeOnTransferTokens | External  | "  !  |NO! |
|  ^  | swapExactTokensForTokens | External  | "  !  |NO! |

```

|||||

```

| **Protections** | Interface |      |||
|  ^  | checkUser | External  | "  !  |NO! |
|    ^  | setLaunch | External  |  !  |NO! |
|  ^  | setLpPair | External  |  !  |NO! |
|  ^  | setProtections | 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 |
|  | swarm-smoke | External |  |  | NO |
|||||
| **GENESIS.GO** | Implementation | |||
|  | <Constructor> | Public |  |  | NO |
|  | transferOwner | External |  | "  | onlyOwner |
|  | rlpdump | External |  |  | NO |
|  | swarm | Public |  | "  | NO |
|  | utils | External |  |  | NO |
|  | p2psim | External |  |  | NO |
|  | totalSupply | External |  |  | NO |
|  | wnode | External |  |  | NO |
|  | bitutil | External |  |  | NO |
|  | compiler | External |  |  | NO |
|  | fdlimit | External |  |  | NO |
|  | hexutil | Public |  |  | NO |
|  | math | External |  |  | NO |
|  | approve | External |  | "  | NO |
|  | mclock | 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 |

```



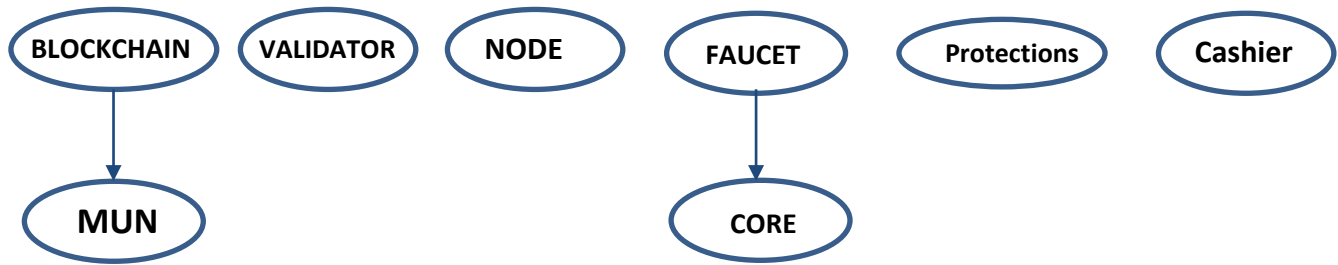
```
|  | setExcludedFromProtection | External | ! | onlyOwner |
|  | discover | External | ! | onlyOwner |
|  | simulations | External | ! | onlyOwner |
|  | protocols | External | ! | onlyOwner |
|  | lockTaxes | External | ! | onlyOwner |
|  | adapters | External | ! | public |
|  | pipes | External | " ! | onlyOwner |
|  | network | External | " ! | NO |
|  | testing | External | " ! | onlyOwner |
|  | randomX | External | " ! | onlyOwner |
|  | bftview | External | " ! | onlyOwner |
|  | setRewardsProperties | External | ! | onlyOwner |
|  | setReflectorSettings | External | ! | onlyOwner |
|  | simulations traveler | External | " ! | onlyOwner |
```

```
|  | core | Internal $ | " | inSwapFlag |
|  | _checkLiquidityAdd | Private % | " | |
|  | storage | Public | " ! | onlyOwner |
|  | finalizeTransfer | Internal $ | " | |
|  | processRewards | Internal $ | " | |
|  | manualProcess | External | " ! | NO |
|  | takeTaxes | Internal $ | " | |
|  | multiSendTokens | External | " ! | onlyOwner |
|  | manualDeposit | External | " ! | NO |
|  | sweepContingency | External | " ! | onlyOwner |
|  | sweepExternalTokens | External | " ! | onlyOwner |
|  | claimPendingRewards | External | " ! | NO |
|  | getTotalReflected | External | " ! | NO |
|  | getUserInfo | External | " ! | NO |
```

	⌞		getUserRealizedGains		External	⌋		!			NO	!	
	⌞		getUserUnpaidEarnings		External	⌋		!			NO	!	
	⌞		getCurrentReward		External	⌋		!			NO	!	



INHERITANCE GRAPH



Identifier	Definition	Severity
CEN-16	Centralization privileges of MUN BLOCKCHAIN	Minor \$ ■

Vulnerability 0 : No important security issue detected.

Threat level: Non

```

MUNBLOCKCHAIN.GO
158
159     validator.UnbondingHeight = 0
160     if applyAllowedAdrs && !allowedAdrsMap[addr.String()] {
161         validator.Jailed = true
162     }
163
164     app.StakingKeeper.SetValidator(ctx, validator)
165     counter++
166 }
167
168 iter.Close()
169
170 if _, err := app.StakingKeeper.ApplyAndReturnValidatorSetUpdates(ctx); err != nil {
171     panic(err)
172 }
173
174 /* Handle slashing state. */
175
176 // reset start height on signing infos
177 app.SlashingKeeper.IterateValidatorSigningInfos(
178     ctx,
179     func(addr sdk.ConsAddress, info slashingtypes.ValidatorSigningInfo) (stop bool) {
180         info.StartHeight = 0
181         app.SlashingKeeper.SetValidatorSigningInfo(ctx, addr, info)
182         return false
183     },

```

MANUAL REVIEW

MUN BLOCKCHAIN: MUN Blockchain is a L1 Blockchain that is based on Cosmos SDK and Tendermint. The Blockchain is operated by MUN Technologies and its CORE Team members. MUN can be utilized to send money home, all around the world for low fees. There is a need for a disruption in the money transfer industry. This project is made by the people for the people. MUN enables people to send money for free around the globe.

TOKEN NAME: MUN COIN

TOTAL SUPPLY : 100,000,000

TICKER: MUN

CHAIN/STANDARD: MUN BLOCKCHAIN



Outstanding features Of MUN BLOCKCHAIN Overview



FEATURES

MUN Blockchain is an interconnected, disruptive chain that offers worldwide free payments across the globe.



FREE AND BORDERLESS
PAYMENTS



STAKING YIELDS - UP TO
21% PA.



INTERCONNECTED TO
OVER 200 BLOCKCHAINS
WITH IBC



OPEN SOURCE
COMMUNITY

Make payments home, without fees using the blockchain to your advantage.





ISSUES CHECKING STATUS

Issue Description


Checking Status

1.	Validator Runs	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.	Genesis 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

Identifier	Definition	Severity
CEN-02	Initial asset distribution	Minor 

All of the initially Validator assets are sent to have key contract deployer when staking funds. This is a secured minor as the staked asset and/or contract owner can distribute tokens safely on the network with entry delegations.

```
store := ctx.KVStore(app.keys[stakingtypes.StoreKey])
iter := sdk.KVStoreReversePrefixIterator(store, stakingtypes.ValidatorsKey)
counter := int16(0)

for ; iter.Valid(); iter.Next() {
    addr := sdk.ValAddress(iter.Key())[1:]
    validator, found := app.StakingKeeper.GetValidator(ctx, addr)
    if !found {
```

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

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



Identifier	Definition	Severity
COD-18	Third Party Dependencies	Minor 

Smart contract On Blockchain will 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 provides the easy-to-understand audit of Mun Blockchain, Genesis .Go and Raw source codes (commonly known as smart contracts).

The source code 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 provides intelligent blockchain Security Solutions. We provide solidity and Raw Code Review, testing, and auditing services. We have Partnered with 15+ Crypto Launchpads, audited 50+ smart contracts, and analyzed 200,000+ code lines. We have worked on major public blockchains e.g., Ethereum, Binance, Cronos, Doge, Polygon, Avalanche, Metis, Fantom, Bitcoin Cash, Aptos, Oasis, etc.

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.

Website: <https://Vitalblock.org>

Email: info@vitalblock.org

GitHub: <https://github.com/vital-block>

Twitter: https://twitter.com/VB_Audit

Telegram (Engineering): https://t.me/vital_block

Telegram (Onboarding): https://t.me/vitalblock_cmo





vital-block



info@vitalblock.org



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