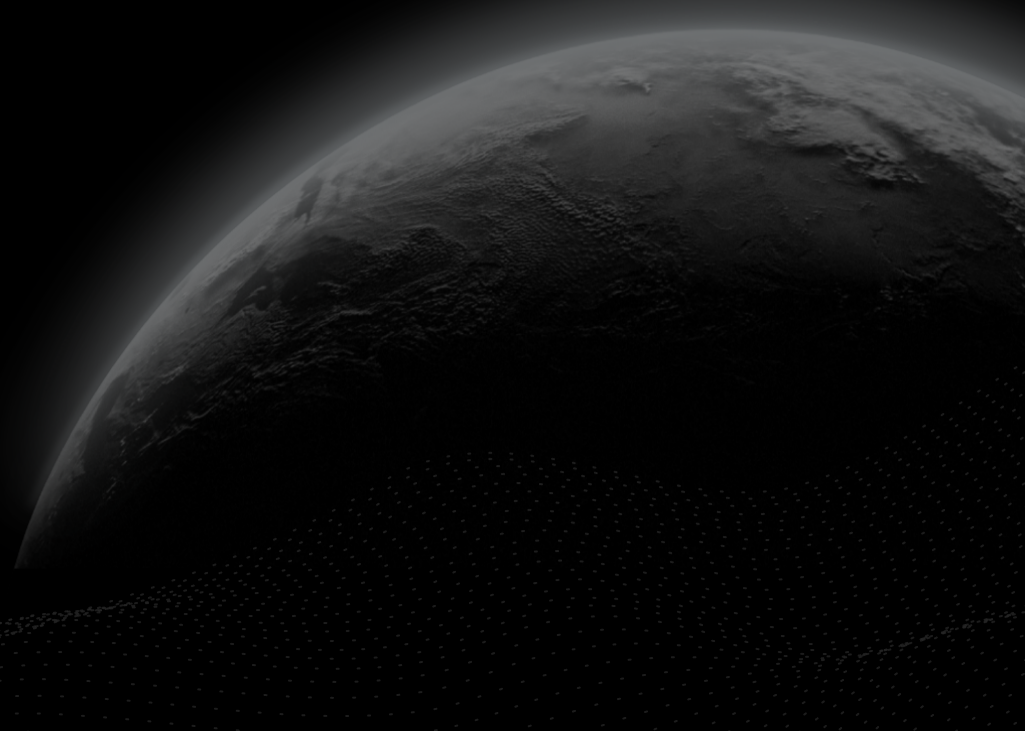
CERTIK

Security Assessment

Project ROA - audit

CertiK Verified on Mar 2nd, 2023



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Project ROA - audit

The security assessment was prepared by CertiK, the leader in Web3.0 security.

Executive Summary

TYPES	ECOSYSTEM	METHODS
Others	Solana (SOL)	Manual Review, Static Analysis

LANGUAGE	TIMELINE	KEY COMPONENTS
Rust	Delivered on 03/02/2023	N/A

CODEBASE

https://github.com/ProjectROA/mint-token

...View All

COMMITS

- 272299c5b82f799c8ff18e44f7c6c0428b7b1fb6
- bca6315f7225f28e23a1a4545bf41304d90b821e

...View All

Vulnerability Summary

2	2	0	0	0	0	0
Total Findings	Resolved	Mitigated	Partially Resolved	Acknowledged	Declined	Unresolved

0	Critical		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.
0	Major		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.
0	Medium		Medium risks may not pose a direct risk to users' funds, but they can affect the overall functioning of a platform.
0	Minor		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.
2	Informational	2 Resolved	Informational errors are often recommendations to improve the style of the code or certain operations to fall within industry best practices. They usually do not affect the overall functioning of the code.

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CODEBASE | PROJECT ROA - AUDIT

Repository

https://github.com/ProjectROA/mint-token

Commit

- 272299c5b82f799c8ff18e44f7c6c0428b7b1fb6
- bca6315f7225f28e23a1a4545bf41304d90b821e

AUDIT SCOPE | PROJECT ROA - AUDIT

1 file audited ● 1 file with Resolved findings

ID	File	SHA256 Checksum
● PRO	src/main.rs	541220a524e701b162f76ee8f5b10918700bb83ec91b66782bea9274c0d5e7b1

APPROACH & METHODS | PROJECT ROA - AUDIT

This report has been prepared for ROA to discover issues and vulnerabilities in the source code of the Project ROA - audit project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Manual Review and Static Analysis techniques.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- 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.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Testing the smart contracts against both common and uncommon attack vectors;
- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

REVIEW NOTES | PROJECT ROA - AUDIT

Overview

Project ROA has created a Solana token generation program with an initial mint.

External Dependencies

The project ROA uses the pre-built SPL token program (TokenkegQfeZyiNwAJbNbGKPFXCWuBvf9Ss623VQ5DA) on the Solana chain to generate fungible tokens. Unlike on the EVM-based chain, the built-in SPL token program eliminates the need to create an individual token contract/program.

Note: The SPL token program is a component of the Solana blockchain and its security ought to be ensured by Solana. Additionally, the SPL token program is an integral part of the Solana blockchain and is secured by the Solana network.

The project mainly contains the following dependencies:

Dependency	Version
spl-token	3.3.0
solana-program	1.11.4
solana-sdk	1.11.4
solana-client	1.11.4
spl-associated-token-account	1.0.3

It should also be noted here that the code dependencies are being actively developed in the current auditing version. It is necessary to keep the dependencies up-to-date to avoid potential vulnerabilities.

DECENTRALIZATION EFFORTS | PROJECT ROA - AUDIT

Description

Based on the usage of the SPL token program, the `owner` account in the current codebase will be granted the following authorities after the token creation:

- **Mint Authority**: the owner account can mint new tokens via a `MintTo` instruction.
- **Freeze Authority**: the owner account has the authority over the following instructions related to the account freezing:
  - `FreezeAccount` : Freeze an initialized account, for example, temporarily stopping account transfers, approvals, burning, etc.
  - `ThawAccount` : Thaw a frozen account.

Recommendations

The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralization, which in most cases cannot be resolved entirely at the present stage. We advise the client to carefully manage the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., multisignature wallets. Indicatively, here are some feasible suggestions that would also mitigate the potential risk at a different level in terms of short-term, long-term and permanent:

Short Term

Timelock and Multi sign (⅔, ⅗) combination *mitigate* by delaying the sensitive operation and avoiding a single point of key management failure.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key compromised;
  AND
- A medium/blog link for sharing the timelock contract and multi-signers addresses information with the public audience.

Long Term

Timelock and DAO, the combination, *mitigate* by applying decentralization and transparency.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
  AND

- Introduction of a DAO/governance/voting module to increase transparency and user involvement.
  AND
- A medium/blog link for sharing the timelock contract, multi-signers addresses, and DAO information with the public audience.

Permanent:

Renouncing the ownership or removing the function can be considered *fully resolved*.

- Renounce the ownership and never claim back the privileged roles.
  OR
- Remove the risky functionality.

Alleviation

[**Project ROA Team**, 02/26/2023]: The keypair file had been encrypted and transferred to a USB drive after the token generation was completed, and it has been deleted from the hard disk, so it is currently inaccessible.

FINDINGS | PROJECT ROA - AUDIT

2	0	0	0	0	2
Total Findings	Critical	Major	Medium	Minor	Informational

This report has been prepared to discover issues and vulnerabilities for Project ROA - audit. Through this audit, we have uncovered 2 issues ranging from different severity levels. Utilizing the techniques of Manual Review & Static Analysis to complement rigorous manual code reviews, we discovered the following findings:

ID	Title	Category	Severity	Status
PRO-02	Missing Error Handling On Unexpected URL Selection	Logical Issue	Informational	Resolved
PRO-03	Missing Updating `recent_blockhash`	Logical Issue	Informational	Resolved

PRO-02 MISSING ERROR HANDLING ON UNEXPECTED URL SELECTION

Category	Severity	Location	Status
Logical Issue	Informational	src/main.rs: 39~42	Resolved

Description

The project's codebase permits users to utilize RPC URLs for Solana Devnet and Mainnet. However, there is a concern that if the input value corresponds to another network, such as the Testnet, the Devnet RPC will be utilized by default, which may cause unexpected issues.

Recommendation

It is recommended that an error be thrown when an unexpected network, i.e., one outside of the Mainnet and Devnet, is selected.

Alleviation

[**Project ROA Team**, 02/26/2023]: The team resolved this issue by adding additional URL validation in the commit bca6315f7225f28e23a1a4545bf41304d90b821e1fcf960b6.

PRO-03 | MISSING UPDATING `recent_blockhash`

Category	Severity	Location	Status
Logical Issue	Informational	src/main.rs: 106, 129	Resolved

Description

To prevent duplication and to establish a transaction's lifetime, a recent block hash is included in the transaction and if the recent block hash is too old the transaction will be rejected.

In the codebase, the `recent_blockhash` is acquired only once at the start of the program, and all three transactions - create mint, create associated token account, and mint token - use the same `recent_blockhash` . This approach could lead to potential failures due to the transaction's execution time.

Reference: Recent Blockhash

Recommendation

Recommend using the latest `recent_blockhash` for each new transaction to avoid potential unexpected rejections.

Alleviation

[**Project ROA Team**, 02/23/2023]: The team resolved this issue by using the latest `recent_blockhash` in the commit bca6315f7225f28e23a1a4545bf41304d90b821e1fcf960b6.

APPENDIX | PROJECT ROA - AUDIT

Finding Categories

Categories	Description
Logical Issue	Logical Issue findings detail a fault in the logic of the linked code, such as unintended deviations from the original business logic of the code base.

Checksum Calculation Method

The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux "sha256sum" command against the target file.

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