QuillAudits

Audit Report
May, 2024

For

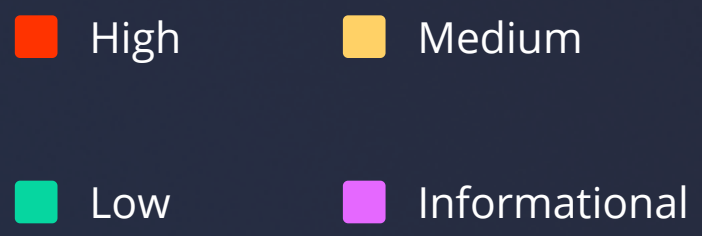
ALVARA

Table of Content

Executive Summary

Project Name	AlvaraAvax
Overview	AlvaraAvax token is an upgradeable ERC20 token for Alvara Ecosystem.
Timeline	20th May 2024 - 28th May 2024
Method	Manual Review, Functional Testing, Automated Testing, etc. All the raised flags were manually reviewed and re-tested to identify any false positives.
Audit Scope	This audit aimed to analyze the AlvaraAvax Codebase for quality, security, and correctness. 1. AlvaraAvax.sol
Source Code	*https://github.com/Alvara-Protocol/alvara-contracts/blob/alvara-launch/contracts/tokens/AlvaraAvax.sol*
Branch	alvara-launch
Commit Hash	b32b077f21cd8119c85088839e8948e092aaa0fa
Fixed In	*https://github.com/Alvara-Protocol/alvara-contracts/commit/051ed21f0fef7f58211b4bb4206525cb2f5ca0a0*

Number of Security Issues per Severity



	High	Medium	Low	Informational
Open Issues	0	0	0	0
Acknowledged Issues	0	0	0	1
Partially Resolved Issues	0	0	0	0
Resolved Issues	0	0	0	1

Checked Vulnerabilities

- Re-entrancy
- Timestamp Dependence
- Gas Limit and Loops
- DoS with Block Gas Limit
- Transaction-Ordering Dependence
- Use of tx.origin
- Exception disorder
- Gasless send
- Balance equality
- Byte array
- Transfer forwards all gas
- ERC20 API violation
- Compiler version not fixed
- Redundant fallback function
- Send instead of transfer
- Style guide violation
- Unchecked external call
- Unchecked math
- Unsafe type inference
- Implicit visibility level

Techniques and Methods

Throughout the audit of smart contracts, care was taken to ensure:

- The overall quality of code.
- Use of best practices.
- Code documentation and comments match logic and expected behavior.
- Token distribution and calculations are as per the intended behavior mentioned in the whitepaper.
- Implementation of ERC-20 token standards.
- Efficient use of gas.
- Code is safe from re-entrancy and other vulnerabilities.

The following techniques, methods, and tools were used to review all the smart contracts.

Structural Analysis

In this step, we have analyzed the design patterns and structure of smart contracts. A thorough check was done to ensure the smart contract is structured in a way that will not result in future problems.

Static Analysis

A static Analysis of Smart Contracts was done to identify contract vulnerabilities. In this step, a series of automated tools are used to test the security of smart contracts.

Code Review / Manual Analysis

Manual Analysis or review of code was done to identify new vulnerabilities or verify the vulnerabilities found during the static analysis. Contracts were completely manually analyzed, their logic was checked and compared with the one described in the whitepaper. Besides, the results of the automated analysis were manually verified.

Gas Consumption

In this step, we have checked the behavior of smart contracts in production. Checks were done to know how much gas gets consumed and the possibilities of optimization of code to reduce gas consumption.

Tools and Platforms used for Audit

Hardhat, Foundry.

Types of Severity

Every issue in this report has been assigned to a severity level. There are four levels of severity, and each of them has been explained below.

High Severity Issues

A high severity issue or vulnerability means that your smart contract can be exploited. Issues on this level are critical to the smart contract's performance or functionality, and we recommend these issues be fixed before moving to a live environment.

Medium Severity Issues

The issues marked as medium severity usually arise because of errors and deficiencies in the smart contract code. Issues on this level could potentially bring problems, and they should still be fixed.

Low Severity Issues

Low-level severity issues can cause minor impact and are just warnings that can remain unfixed for now. It would be better to fix these issues at some point in the future.

Informational

These are four severity issues that indicate an improvement request, a general question, a cosmetic or documentation error, or a request for information. There is low-to-no impact.

Types of Issues

Open

Security vulnerabilities identified that must be resolved and are currently unresolved.

Resolved

These are the issues identified in the initial audit and have been successfully fixed.

Acknowledged

Vulnerabilities which have been acknowledged but are yet to be resolved.

Partially Resolved

Considerable efforts have been invested to reduce the risk/impact of the security issue, but are not completely resolved.

Informational Issues

1. Centralization Risk leads to central point of failure

Path

AlvaraAvax.sol

Description

Since MINTER_ROLE and BURN_ROLE are the 2 most important roles in the contract, responsible for minting and burning of tokens, it is therefore really important to make sure that these roles are well trusted.

A compromised role will result in unlimited amounts of minting and burning of AlvaraAvax token.

Recommendation

Ensure that minting and burning roles are trusted.

Status

Acknowledged

2. Constant values such as a call to `keccak256()`, should used to immutable rather than constant

Path

AlvaraAvax.sol

Function

```
bytes32 public constant MINTER_ROLE = keccak256("MINTER_ROLE");
bytes32 public constant BURN_ROLE = keccak256("BURN_ROLE");
```

Description

There is a difference between constant variables and immutable variables, and they should each be used in their appropriate contexts.

While it doesn't save any gas because of the compiler handling, it's still best to use the right tool for the task at hand.

Constants should be used for literal values written into the code, and immutable variables should be used for expressions or values calculated in or passed into the constructor.

Recommendation

Change these values from constant to immutable.

Status

Resolved

Functional Tests Cases

Some of the tests performed are mentioned below:

- Should get the name of the token
- Should get the symbol of the token
- Should approve another account to spend token
- Should transfer tokens to other address
- Should approve another account to spend token

Automated Tests

No major issues were found. Some false positive errors were reported by the tools. All the other issues have been categorized above according to their level of severity.

Closing Summary

In this report, we have considered the security of the AlvaraAvax contract. We performed our audit according to the procedure described above.

Some issues of Medium, Low and informational severity were found, Some suggestions and best practices are also provided in order to improve the code quality and security posture.

Disclaimer

QuillAudits Smart contract security audit provides services to help identify and mitigate potential security risks in AlvaraAvax smart contracts. However, it is important to understand that no security audit can guarantee complete protection against all possible security threats. QuillAudits audit reports are based on the information provided to us at the time of the audit, and we cannot guarantee the accuracy or completeness of this information. Additionally, the security landscape is constantly evolving, and new security threats may emerge after the audit has been completed.

Therefore, it is recommended that multiple audits and bug bounty programs be conducted to ensure the ongoing security of AlvaraAvax smart contracts. One audit is not enough to guarantee complete protection against all possible security threats. It is important to implement proper risk management strategies and stay vigilant in monitoring your smart contracts for potential security risks.

QuillAudits cannot be held liable for any security breaches or losses that may occur subsequent to and despite using our audit services. It is the responsibility of the AlvaraAvax to implement the recommendations provided in our audit reports and to take appropriate steps to mitigate potential security risks.

About QuillAudits

QuillAudits is a secure smart contracts audit platform designed by QuillHash Technologies. We are a team of dedicated blockchain security experts and smart contract auditors determined to ensure that Smart Contract-based Web3 projects can avail the latest and best security solutions to operate in a trustworthy and risk-free ecosystem.

1000+
Audits Completed

$30B
Secured

1M+
Lines of Code Audited

Follow Our Journey

Audit Report
May, 2024

For

ALVARA

QuillAudits

Canada, India, Singapore, UAE, UK

www.quillaudits.com

audits@quillhash.com