Lab Astral

MYRT Token

Smart Contract Audit
Final Report

May 18, 2022

Introduction

1. About Lab Astral

Lab Astral is a world-class team of experts in computer science, economics, and finance, Based in Malaysia, Lab Astral provides cutting-edge blockchain research, and technical and project solutions with key capabilities in infrastructure, Sinartoontreots, and marketplace automation.

Currently, Lab Astral is developing new blockchain consensus models that are more energy efficient including Proof of Stake and Proof of History, etc, layer 2 protocols for private blockchains to integrate with popular main nets in the market, and smart contracts with or without /PFC integrations. These developments will provide the framework, and protocols for wob3 to be plugged and play with existing web2 assets.

Visit https://labastral.com/ to know more about it.

2. About ImmuneBytes

ImmuneBytes is a security start-up to provides professional services in the blockchain space. The team has hands-on experience in conducting smart contract audits, penetration testing, and security consulting. ImmuneBytes's security auditors have worked on various A-league projects and have a great understanding of DeFi projects like AAVE, Compound, 0x Protocol, Uniswap, and dydx.

The team has been able to secure 105+ blockchain projects by providing security services on different frameworks. ImmuneBytes team helps start-ups with a detailed analysis of the system ensuring security and managing the overall project.

Visit http://immunebytes.com/ to know more about the services.

Documentation Details

The Lab Astral team has provided the following doc for the purpose of audit:

1. Lab Astral MYRT Whitepaper (LA Replied 10.05.2022).docx.pdf
2. https://labastral.com/documents/MYRT-Deck.pdf

Audit Process & Methodology

ImmuneBytes team has performed thorough testing of the project starting with analyzing the code design patterns in which we reviewed the smart contract architecture to ensure it is structured and safe use of third-party smart contracts and libraries.

Our team then performed a formal line-by-line inspection of the Smart Contract in order to find any potential issues like Signature Replay Attacks, Unchecked External Calls, External Contract Referencing, Variable Shadowing, Race conditions, Transaction-ordering dependence, timestamp dependence, DoS attacks, and others.

In the Unit testing phase, we run unit tests written by the developer in order to verify the functions work as intended. In Automated Testing, we tested the Smart Contract with our in-house developed tools to identify vulnerabilities and security flaws.

The code was audited by a team of independent auditors which includes -

1. Testing the functionality of the Smart Contract to determine proper logic has been followed throughout.
2. Analyzing the complexity of the code by thorough, manual review of the code, line-by-line.
3. Deploying the code on testnet using multiple clients to run live tests.
4. Analyzing failure preparations to check how the Smart Contract performs in case of bugs and vulnerabilities.
5. Checking whether all the libraries used in the code are on the latest version.
6. Analyzing the security of the on-chain data.

Audit Details

- Project Name: Lab Astral
- Contracts Name: myrt.sol
- Languages: Solidity(Smart contract), Typescript (Unit Testing)
- Github commits for audit: 461980f6d1ecfd43ac9c95e97b167caf824f8a2a
- Platforms and Tools: Remix IDE, Truffle, Truffle Team, Ganache, Solhint, VScode, Contract Library, Slither, SmartCheck

Audit Goals

The focus of the audit was to verify that the smart contract system is secure, resilient, and working according to its specifications. The audit activities can be grouped into the following three categories:

1. Security: Identifying security-related issues within each contract and within the system of contracts.
2. Sound Architecture: Evaluation of the architecture of this system through the lens of established smart contract best practices and general software best practices.
3. Code Correctness and Quality: A full review of the contract source code. The primary areas of focus include
    a. Correctness
    b. Readability
    c. Sections of code with high complexity
    d. Quantity and quality of test coverage

Security Level Reference

Every issue in this report were assigned a severity level from the following:

High severity issues will bring problems and should be fixed.

Medium severity issues could potentially bring problems and should eventually be fixed.

Low severity issues are minor details and warnings that can remain unfixed but would be better fixed at some point in the future.

Issues	High	Medium	Low
Open	-	-	-
Closed	-	-	1

High Severity Issues

No issues were found.

Medium Severity Issues

No issues were found.

Low Severity Issues

1. **External Visibility should be preferred**

   Explanation:
   Those functions which are not called internally by the contract should be marked with external visibility instead of public visibility. This will effectively result in gas optimization.

   Recommendation:
   The mint and burn function can be refactored to external functions as follows:

```solidity
// SPDX-License-Identifier: MIT
pragma solidity >=0.4.22 <0.9.0;
import "@openzeppelin/contracts/access/Ownable.sol";
import "@openzeppelin/contracts/token/ERC20/ERC20.sol";

contract MYRT is ERC20, Ownable{
    constructor () ERC20("MYRT", "myrt") Ownable(){
        _mint(msg.sender, 25000000000 * ( 10 ** uint256(decimals())));
    }
    function mint(address account, uint256 amount) external onlyOwner {
        _mint(account, amount);
    }
    function burn(address account, uint256 amount) external onlyOwner {
        _burn(account, amount);
    }
}
```

Recommendation / Informational

1. **Unlocked Pragma statements found in the contracts**
   Line no: 2

   Explanation:
   During the code review, it was found that the contracts included unlocked pragma solidity version statements.

   It's not considered a better practice in Smart contract development to do so as it might lead to accidental deployment to a version with unfixed bugs.

   Recommendation:
   It's always recommended to lock pragma statements to a specific version while writing contracts.

2. **Infinite Token Supply**

   Current implementation allows the owner to mint an unlimited amount of tokens. If this is not intentional, it is recommended to include a maximum supply for the token within the contract.

Unit Tests

```
Compiling your contracts...
===========================
> Compiling ./contracts/myrt.sol
> Compiling @openzeppelin/contracts/access/Ownable.sol
> Compiling @openzeppelin/contracts/token/ERC20/ERC20.sol
> Compiling @openzeppelin/contracts/token/ERC20/IERC20.sol
> Compiling @openzeppelin/contracts/token/ERC20/extensions/IERC20Metadata.sol
> Compiling @openzeppelin/contracts/utils/Context.sol
> Artifacts written to /var/folders/jz/tqv1m4pd7zzdhyz78f_685xm0000gn/T/test--41212-o2kLgEeImndk
> Compiled successfully using:
   - solc: 0.8.10+commit.fc410830.Emscripten.clang


  Contract: MYRT
    ✔ sender should has 25 billion MYRT
    ✔ owner address should be sender address
    ✔ owner should be able to burn MYRT (1043ms)
    ✔ other user should be unable to burn MYRT (1117ms)
    ✔ owner should be able to mint MYRT (1033ms)
    ✔ other user should be unable to mint MYRT (1028ms)
    ✔ should be able to transfer ownership (1037ms)
    ✔ other should not be able to transfer ownership (1048ms)
    ✔ owner should be null afer renounce ownership (1038ms)
    ✔ other should not be able to renounce ownership (1031ms)


  10 passing (19s)
```

Automated Audit Result

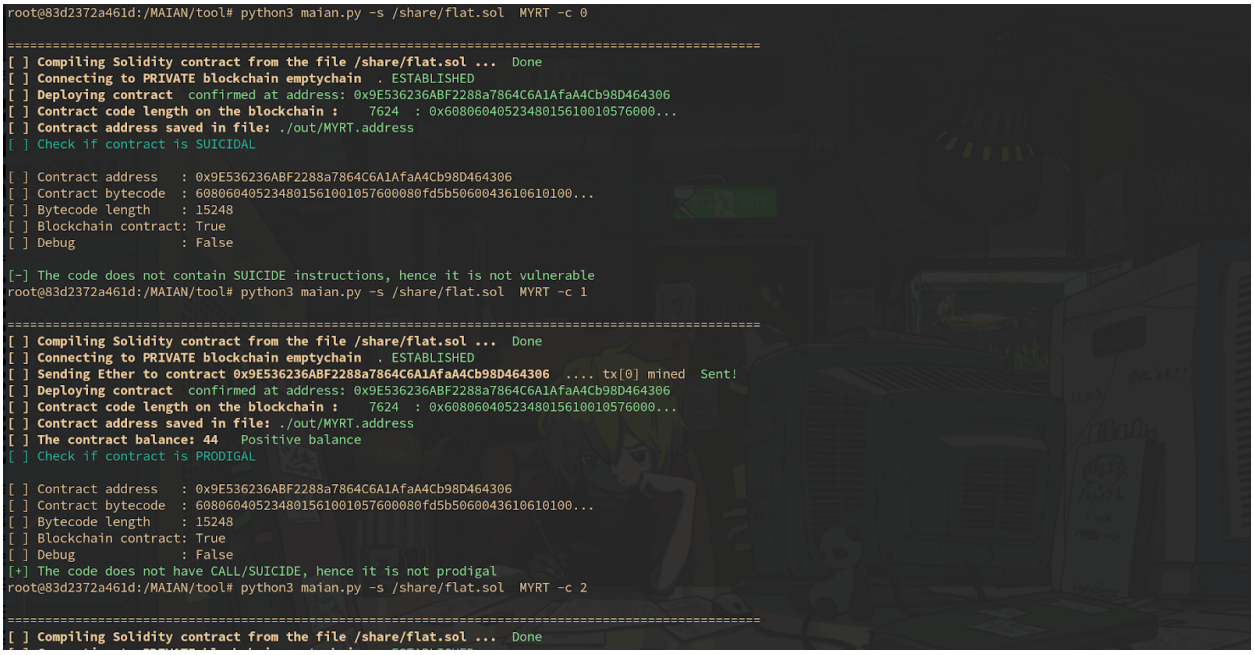
Slither

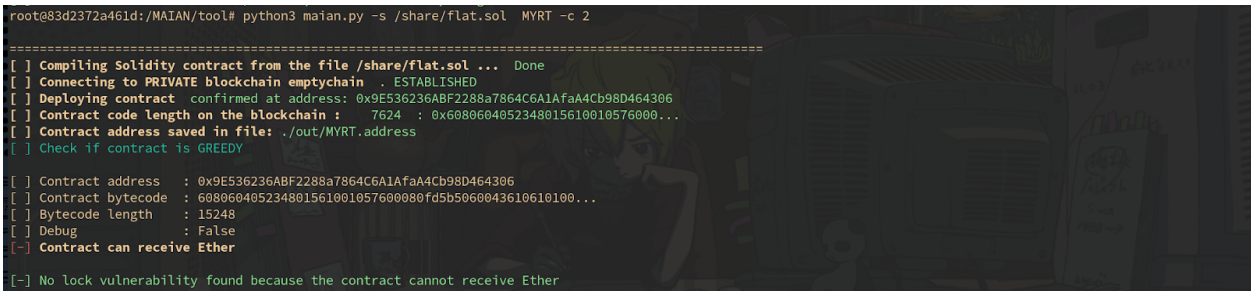
```
Compiled with solc
Number of lines: 621 (+ 0 in dependencies, + 0 in tests)
Number of assembly lines: 0
Number of contracts: 6 (+ 0 in dependencies, + 0 tests)

Number of optimization issues: 12
Number of informational issues: 10
Number of low issues: 0
Number of medium issues: 0
Number of high issues: 0

ERCs: ERC20

+------+-------------+-------+--------------------+-------------+----------+
| Name | # functions |  ERCS |     ERC20 info     | Complex code | Features |
+------+-------------+-------+--------------------+-------------+----------+
| MYRT |      38     | ERC20 |     ∞ Minting      |      No      |          |
|      |             |       | Approve Race Cond. |              |          |
|      |             |       |                    |              |          |
+------+-------------+-------+--------------------+-------------+----------+
```

Maian Bytecode Analysis

```
root@83d2372a461d:/MAIAN/tool# python3 maian.py -b /share/flat.bytecode  -c 0

================================================================================================
[ ] Check if contract is SUICIDAL

[ ] Contract address   : 0xaFFECAFEAFfECaFEaFFecAfEAFfecAfEAffEcaFE
[ ] Contract bytecode  : 6080604052348015620000115760008 0fd5b50604051806040...
[ ] Bytecode length    : 19938
[ ] Blockchain contract: False
[ ] Debug              : False

[-] The code does not contain SUICIDE instructions, hence it is not vulnerable
root@83d2372a461d:/MAIAN/tool# python3 maian.py -b /share/flat.bytecode  -c 1

================================================================================================
[ ] Check if contract is PRODIGAL

[ ] Contract address   : 0xaFFECAFEAFfECaFEaFFecAfEAFfecAfEAffEcaFE
[ ] Contract bytecode  : 6080604052348015620000115760008 0fd5b50604051806040...
[ ] Bytecode length    : 19938
[ ] Blockchain contract: False
[ ] Debug              : False
[+] The code does not have CALL/SUICIDE, hence it is not prodigal
root@83d2372a461d:/MAIAN/tool# python3 maian.py -b /share/flat.bytecode  -c 2

================================================================================================
[ ] Check if contract is GREEDY

[ ] Contract address   : 0xaFFECAFEAFfECaFEaFFecAfEAFfecAfEAffEcaFE
[ ] Contract bytecode  : 6080604052348015620000115760008 0fd5b50604051806040...
[ ] Bytecode length    : 19938
[ ] Debug              : False
[-] Contract can receive Ether

[-] No lock vulnerability found because the contract cannot receive Ether
```

Maian Solidity Code Analysis

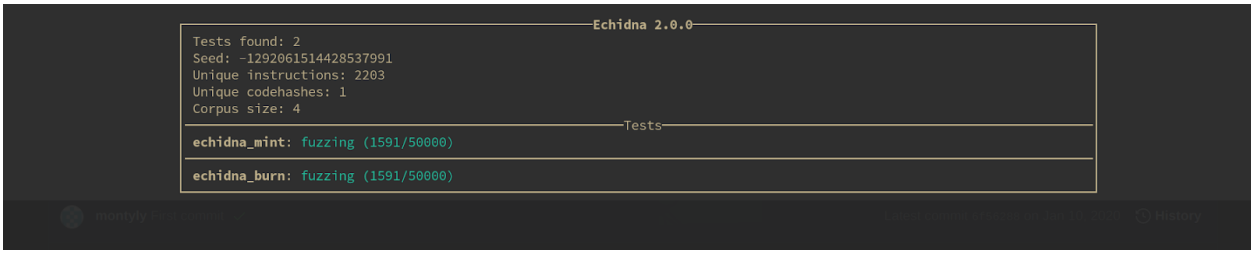


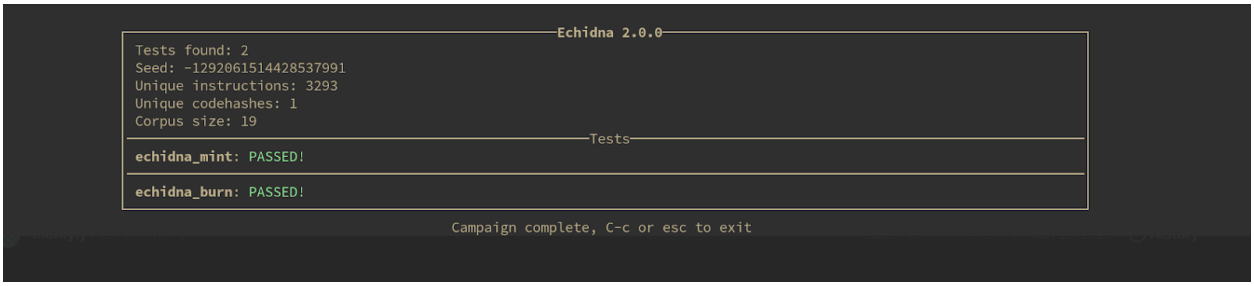


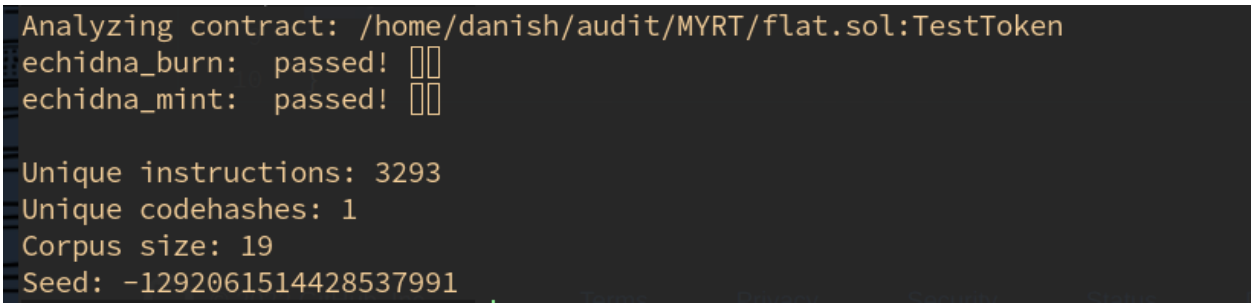
Mythril

This audit does not provide a security or correctness guarantee of the audited smart contract. Securing smart contracts is a multistep process, therefore running a bug bounty program as a complement to this audit is strongly recommended.

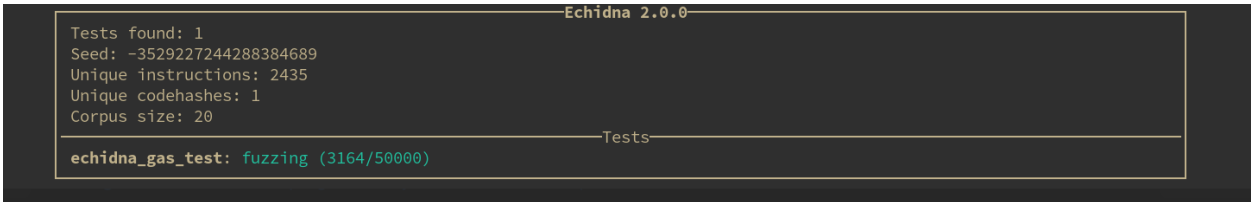
Echidna

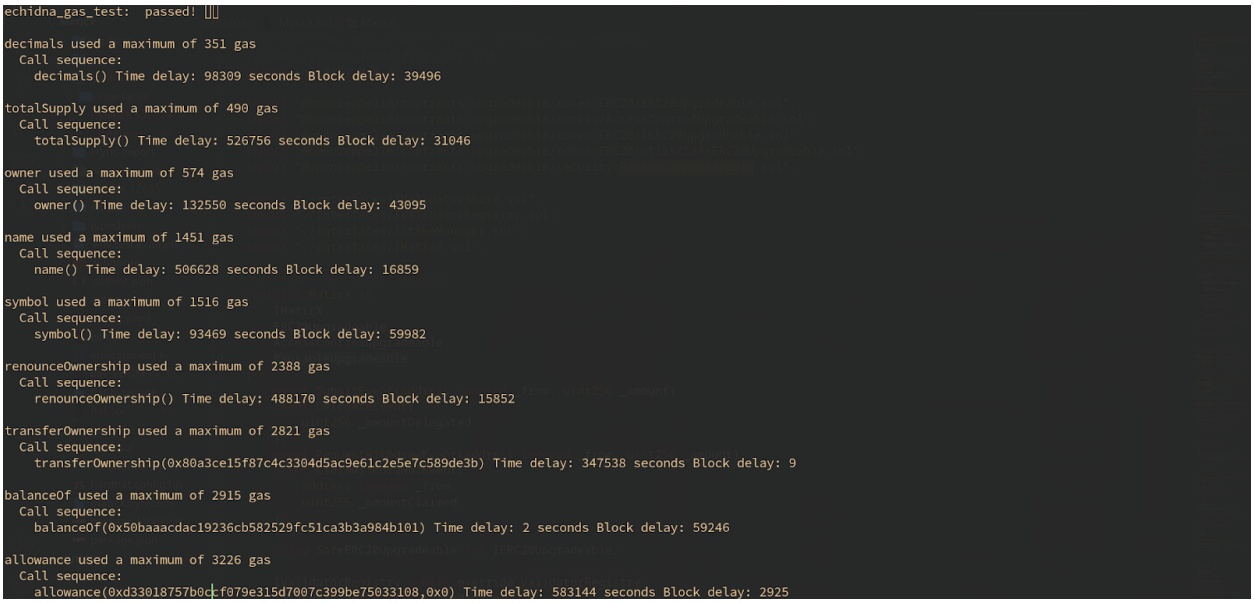


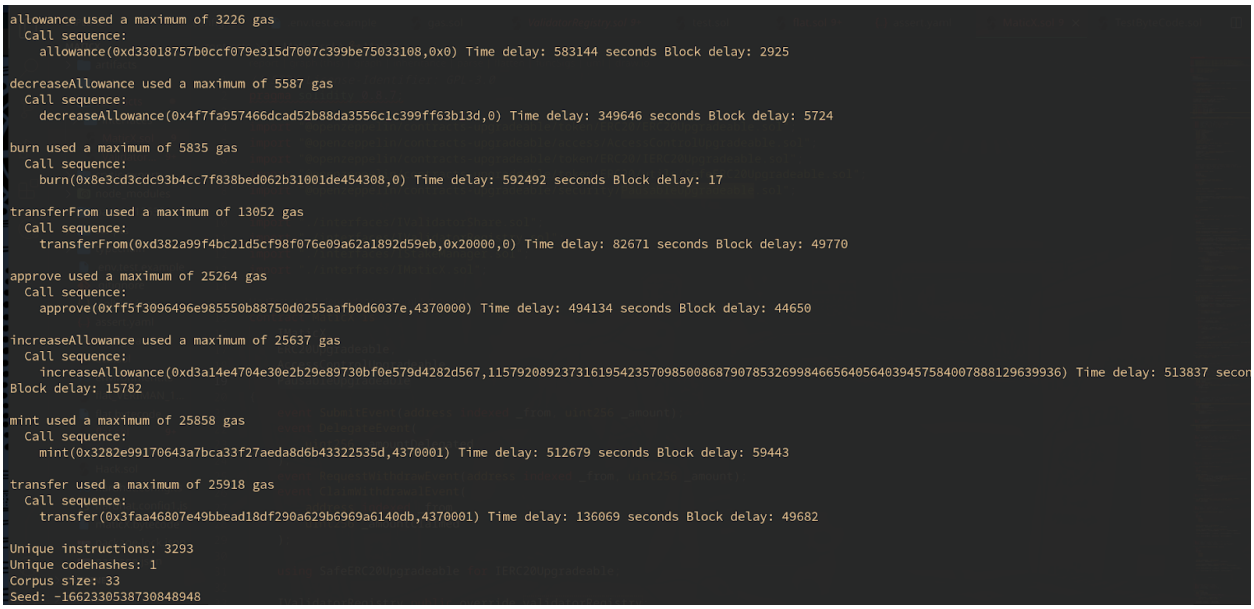




Echidna Gas Test







This audit does not provide a security or correctness guarantee of the audited smart contract. Securing smart contracts is a multistep process, therefore running a bug bounty program as a complement to this audit is strongly recommended.

Concluding Remarks

While conducting the audits of the Lab Astral smart contract, it was observed that the contracts contain only one Low severity issue.

Our auditors suggest that the Low severity issue should be resolved by the developers. The recommendations given will improve the operations of the smart contract.

Disclaimer

ImmuneBytes's audit does not provide a security or correctness guarantee of the audited smart contract. Securing smart contracts is a multistep process, therefore running a bug bounty program as a complement to this audit is strongly recommended.

Our team does not endorse the Lab Astral platform or its product nor this audit is investment advice.
Notes:

- Please make sure contracts deployed on the mainnet are the ones audited.
- Check for the code refactor by the team on critical issues.

ImmuneBytes