Code Security Assessment

Stripto Marketplace-Addendum

Jan 28th, 2022

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Disclaimer

About

Summary

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

- 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.

Overview

Project Summary

Project Name	Stripto Marketplace-Addendum
Platform	bsc
Language	Solidity
Codebase	https://github.com/striptoken/strip_token_contract/blob/604435d12c269da56746ec48d7cbb7d032e9df95/Stripto_smar
Commit	604435d12c269da56746ec48d7cbb7d032e9df95 ed491e9fff4e307485020ede6785e8d1f80c3b36

Audit Summary

Delivery Date	Jan 28, 2022
Audit Methodology	Static Analysis, Manual Review

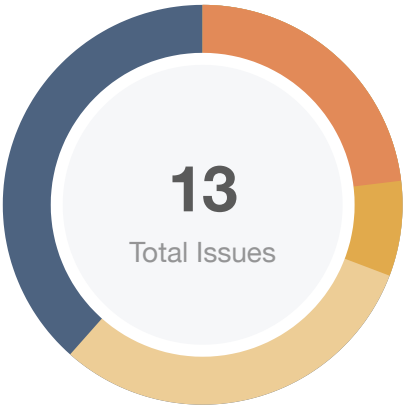
Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Mitigated
Critical	0	0	0	0	0	0
Major	3	0	0	2	0	0
Medium	1	0	0	1	0	0
Minor	4	0	0	2	0	0
Informational	5	0	0	3	0	0
Discussion	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
SSM	Stripto_smart_contract_revised.sol	b99dd906b204ad2915b99ff4a8f641ffdffa7311aa729886f0444cbe6d9411ec

Findings



Critical	**0** (0.00%)
Major	**3** (23.08%)
Medium	**1** (7.69%)
Minor	**4** (30.77%)
Informational	**5** (38.46%)
Discussion	**0** (0.00%)

ID	Title	Category	Severity	Status
SSM-01	Third Party Dependencies	Volatile Code	Minor	Acknowledged
SSM-02	Centralization Related Risks	**Centralization / Privilege**	**Major**	Acknowledged
SSM-03	Missing emit events	Coding Style	Informational	Resolved
SSM-04	Variables that could be declared as immutable	Gas Optimization	Informational	Resolved
SSM-05	Initial Token Distribution	**Centralization / Privilege**	**Major**	Acknowledged
SSM-06	Return value not handled	Volatile Code	Informational	Acknowledged
SSM-07	Unchecked value from low-level call	Volatile Code	Minor	Resolved
SSM-08	Redundant Operation	Gas Optimization	Informational	Acknowledged
SSM-09	Limited Effect to Delay the Transfer	Logical Issue	Minor	Resolved
SSM-10	Potential Logic Flaw for Fee Calculation	Logical Issue	Major	Resolved
SSM-11	Fee Collectors	**Centralization / Privilege**	**Medium**	Acknowledged
SSM-12	Redundant Check	Logical Issue	Informational	Acknowledged
SSM-13	Unchecked Value of ERC-20 `transfer()` Call	Logical Issue	Minor	Acknowledged

SSM-01 | Third Party Dependencies

Category	Severity	Location	Status
Volatile Code	Minor	Stripto_smart_contract_revised.sol: 373	Acknowledged

Description

The contract is serving as the underlying entity to interact with third-party `PancakeSwap` protocols. The scope of the audit treats 3rd party entities as black boxes and assume their functional correctness. However, in the real world, 3rd parties can be compromised and this may lead to lost or stolen assets. In addition, upgrades of 3rd parties can possibly create severe impacts, such as increasing fees of 3rd parties, migrating to new LP pools, etc.

Recommendation

We understand that the business logic of `Stripto` requires interaction with `PancakeSwap`. We encourage the team to constantly monitor the statuses of 3rd parties to mitigate the side effects when unexpected activities are observed.

Alleviation

No Alleviation.

SSM-02 | Centralization Related Risks

Category	Severity	Location	Status
Centralization / Privilege	Major	Stripto_smart_contract_revised.sol: 247~250, 252~256, 414~421, 424~428, 430~433, 436~438, 440~444, 446~450, 453~457, 464~474, 476~481, 483~487, 497~502, 504~509, 511~514, 671~677, 680~683	Acknowledged

Description

In the contract, `Ownable`, the role, `_owner`, has authority over the following functions.

- `renounceOwnership()`
- `transferOwnership(address newOwner)`

Any compromise to the `_owner` account may allow the hacker to take advantage of this authority.

In the contract, `Stripto`, the role, `_owner`, has authority over the following functions.

- `enableTrading()`
- `removeLimits()`
- `removeBoughtEarly(address account)`
- `disableTransferDelay()`
- `updateMaxBuyAmount(uint256 newNum)`
- `updateMaxSellAmount(uint256 newNum)`
- `updateSwapTokensAtAmount(uint256 newAmount)`
- `airdropToWallets(address[] memory airdropWallets, uint256[] memory amounts)`
- `excludeFromMaxTransaction(address updAds, bool isEx)`
- `setAutomatedMarketMakerPair(address pair, bool value)`
- `updateBuyFees(uint256 _operationsFee, uint256 _liquidityFee)`
- `updateSellFees(uint256 _operationsFee, uint256 _liquidityFee)`
- `excludeFromFees(address account, bool excluded)`
- `transferForeignToken(address _token, address _to)`
- `withdrawStuckETH()`
- `setOperationsAddress()` in the commit ed491e9fff4e307485020ede6785e8d1f80c3b36

Any compromise to the `_owner` account may allow the hacker to take advantage of this authority.

Recommendation

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

No Alleviation.

SSM-03 | Missing Emit Events

Category	Severity	Location	Status
Coding Style	Informational	Stripto_smart_contract_revised.sol: 424~428, 436~438, 453~457, 464~474, 476~481, 483~487, 497~502, 504~509, 680~683	Resolved

Description

There should always be events emitted in the sensitive functions that are controlled by centralization roles.

Recommendation

It is recommended emitting events for the sensitive functions that are controlled by centralization roles.

Alleviation

The development team resolved this issue in commit ed491e9fff4e307485020ede6785e8d1f80c3b36.

SSM-04 | Variables That Could Be Declared As Immutable

Category	Severity	Location	Status
Gas Optimization	Informational	Stripto_smart_contract_revised.sol: 302	Resolved

Description

The linked variables assigned in the constructor can be declared as `immutable`. Immutable state variables can be assigned during contract creation but will remain constant throughout the lifetime of a deployed contract. A big advantage of immutable variables is that reading them is significantly cheaper than reading from regular state variables since they will not be stored in storage.

Recommendation

We recommend declaring these variables as immutable. Please note that the `immutable` keyword only works in Solidity version `v0.6.5` and up.

Alleviation

The development team resolved this issue in commit ed491e9fff4e307485020ede6785e8d1f80c3b36.

SSM-05 | Initial Token Distribution

Category	Severity	Location	Status
Centralization / Privilege	**Major**	Stripto_smart_contract_revised.sol: 405	Acknowledged

Description

All of the `$STRIP` tokens are sent to the contract deployer when deploying the contract. This could be a centralization risk as the deployer can distribute `$STRIP` tokens without obtaining the consensus of the community.

Recommendation

We recommend the team to be transparent regarding the initial token distribution process, and the team shall make enough efforts to restrict the access of the private key.

Alleviation

No Alleviation.

SSM-06 | Return Value Not Handled

Category	Severity	Location	Status
Volatile Code	Informational	Stripto_smart_contract_revised.sol: 631~638	Acknowledged

Description

The return value of function `addLiquidityETH` is not properly handled.

```
        uniswapV2Router.addLiquidityETH{value: ethAmount}(
            address(this),
            tokenAmount,
            0, // slippage is unavoidable
            0, // slippage is unavoidable
            address(0xdead),
            block.timestamp
        );
```

Recommendation

We recommend using variables to receive the return value of the functions mentioned above and handle both success and failure cases if needed by the business logic.

Alleviation

No Alleviation.

SSM-07 | Unchecked Value From Low-level Call

Category	Severity	Location	Status
Volatile Code	Minor	Stripto_smart_contract_revised.sol: 668, 682	Resolved

Description

Ignores return value of low-level calls.

```
668  (success,) = address(operationsAddress).call{value: address(this).balance}("");
```

```
682  (success,) = address(msg.sender).call{value: address(this).balance}("");
```

Recommendation

If you choose to use the low-level call methods, make sure to handle the possibility that the call will fail, by checking the return value.

Alleviation

The development team resolved this issue in commit ed491e9fff4e307485020ede6785e8d1f80c3b36.

SSM-08 | Redundant Operation

Category	Severity	Location	Status
Gas Optimization	Informational	Stripto_smart_contract_revised.sol: 406	Acknowledged

Description

Since the `newOwner` is `msg.sender`, there is no need to transfer ownership because the `_owner` is initialized as `msg.sender` in the contract `Ownable` when it is deployed.

```
232     constructor () {
233         address msgSender = _msgSender();
234         _owner = msgSender;
235         emit OwnershipTransferred(address(0), msgSender);
236     }
```

```
369 constructor() ERC20("STRIPTO", "$STRIP") {
370 ...
371 address newOwner = msg.sender;
372 ...
373 ...
374 transferOwnership(newOwner);
```

Recommendation

Consider removing the linked code for gas efficiencies and code readability.

Alleviation

No Alleviation.

SSM-09 | Limited Effect To Delay The Transfer

Category	Severity	Location	Status
Logical Issue	Minor	Stripto_smart_contract_revised.sol: 541	Resolved

Description

It is noted that the `if` condition is limited to the specified `uniswapV2Pair` pair. There are probably multiple pairs in the DEX or in different DEXs. Is that designed as expected?

Recommendation

Consider using a white list.

Alleviation

The development team heeded our advice and resolved this issue in commit ed491e9fff4e307485020ede6785e8d1f80c3b36.

SSM-10 | Potential Logic Flaw For Fee Calculation

Category	Severity	Location	Status
Logical Issue	Major	Stripto_smart_contract_revised.sol: 579~595	Resolved

Description

According the logic of this contract, the early buyer should be punished to undertake high fees and these fees will be accumulated to `tokensForLiquidity` and `tokensForOperations`:

```
579  if(boughtEarly[from] && automatedMarketMakerPairs[to] && block.timestamp <
earlyBuyPenaltyEnd){
580          fees = amount * 75 / 100;
581          tokensForLiquidity += fees * sellLiquidityFee / sellTotalFees;
582          tokensForOperations += fees * sellOperationsFee / sellTotalFees;
583  }
```

However, the above fees will be overwritten and the `tokensForLiquidity` and `tokensForOperations` will be accumulated again by the following code:

```
585  if (automatedMarketMakerPairs[to] && sellTotalFees > 0){
586          fees = amount * sellTotalFees /100;
587          tokensForLiquidity += fees * sellLiquidityFee / sellTotalFees;
588          tokensForOperations += fees * sellOperationsFee / sellTotalFees;
589  }
```

Recommendation

Consider refactoring the `if` condition to `if-else` condition:

```
if(boughtEarly[from] && automatedMarketMakerPairs[to] && block.timestamp <
earlyBuyPenaltyEnd){
    fees = amount * 75 / 100;
    tokensForLiquidity += fees * sellLiquidityFee / sellTotalFees;
    tokensForOperations += fees * sellOperationsFee / sellTotalFees;
}
// on sell
else if (automatedMarketMakerPairs[to] && sellTotalFees > 0){
    fees = amount * sellTotalFees /100;
    tokensForLiquidity += fees * sellLiquidityFee / sellTotalFees;
    tokensForOperations += fees * sellOperationsFee / sellTotalFees;
}
```

Alleviation

The development team resolved this issue in commit ed491e9fff4e307485020ede6785e8d1f80c3b36.

SSM-11 | Fee Collectors

Category	Severity	Location	Status
Centralization / Privilege	**Medium**	Stripto_smart_contract_revised.sol: 302	Acknowledged

Description

There is a fee collector, i.e. `operationsAddress`, over time, this account would gain more and more fees.

Recommendation

In general, we strongly recommend centralized privileges or roles in the protocol to be improved via a decentralized mechanism or via smart-contract based accounts with enhanced security practices, f.e. Multisignature wallets.

Indicatively, here are some feasible solutions that would also mitigate the potential risk:

- Time-lock with reasonable latency, i.e. 48 hours, for awareness on privileged operations;
- Assignment of privileged roles to multi-signature wallets to prevent single point of failure due to the private key;
- Introduction of a DAO / governance / voting module to increase transparency and user involvement.

Alleviation

No Alleviation.

SSM-12 | Redundant Check

Category	Severity	Location	Status
Logical Issue	Informational	Stripto_smart_contract_revised.sol: 524	Acknowledged

Description

In the function `_transfer`, the aforementioned statement `to != address(0)` in `if` condition has been checked in line 519:

```
519  require(to != address(0), "ERC20: transfer to the zero address");
```

Recommendation

Consider removing the redundant check.

Alleviation

No Alleviation.

SSM-13 | Unchecked Value Of ERC-20 `transfer()` Call

Category	Severity	Location	Status
Logical Issue	Minor	Stripto_smart_contract_revised.sol: 675	Acknowledged

Description

The linked `transfer()` invocations do not check the return value of the function call which should yield a `true` result in case of proper ERC-20 implementation.

Recommendation

As many tokens do not follow the ERC-20 standard faithfully, they may not return a `bool` variable in this function's execution meaning that simply expecting it can cause incompatibility with these types of tokens. Instead, we advise that OpenZeppelin's `SafeERC20.sol` implementation is utilized for interacting with the `transfer()` functions of ERC-20 tokens. The OZ implementation optionally checks for a return value rendering compatible with all ERC-20 token implementations.

Alleviation

No Alleviation.

Appendix

Finding Categories

Centralization / Privilege

Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.

Gas Optimization

Gas Optimization findings do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block.timestamp works.

Volatile Code

Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that may result in a vulnerability.

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

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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