Cyberscope

Audit Report

ProfitScraper

March 2023

Network	BSC
Address	0x522e088288E4CdA3edD8810Dbbb58F701F54fFd0
Audited by	© cyberscope

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Review

Explorer	https://bscscan.com/address/0x522e088288e4cda3edd8810dbbb58f701f54ffd0
Address	0x522e088288e4cda3edd8810dbbb58f701f54ffd0

Audit Updates

Initial Audit	22 Mar 2023 https://github.com/cyberscope-io/audits/tree/main/2-ps/v1/audit.pdf
Corrected Phase 2	27 Mar 2023

Source Files

Filename	SHA256
ProfitScraper.sol	3ec0cd6f92c248eaad7efe2a85aa7103adf507e2232917df1a2fe8f13115e36a

Introduction

The ProfitScraper contract allows users to deposit ether and earn rewards over time. It also includes referral rewards for bringing in new users. The contract owner takes a fee from each deposit and withdrawal. The contract keeps track of various statistics such as total invested, total rewards, and total investors. The contract includes safety measures to prevent reentrancy attacks.

Roles

Owner

The owner has authority over the following functions:

- `function getAmount(uint _amount)`
- `function updateContract()`

User

The user can interact with the following functions:

- `function _getNextDepositID()`
- `function deposit(address _referrer)`
- `function claimAllReward()`
- `function getOwnedDeposits(address investor)`
- `function getAllClaimableReward(address _investor)`
- `function getBalance()`
- `function getTotalRewards()`
- `function getTotalInvests()`
- `function getTotalAmountEarned(address _investor)`

Diagnostics

Critical Medium Minor / Informative

Severity	Code	Description	Status
●	PRC	Possible Redundant Calculation	Unresolved
●	CR	Code Repetition	Unresolved
●	PRE	Potential Reentrance Exploit	Unresolved
●	MVW	Multiple Variable Writes	Unresolved
●	PSU	Potential Subtraction Underflow	Unresolved
●	RSML	Redundant SafeMath Library	Unresolved
●	IDI	Immutable Declaration Improvement	Unresolved
●	L04	Conformance to Solidity Naming Conventions	Unresolved
●	L07	Missing Events Arithmetic	Unresolved
●	L13	Divide before Multiply Operation	Unresolved
●	L15	Local Scope Variable Shadowing	Unresolved

PRC - Possible Redundant Calculation

Criticality	Minor / Informative
Location	ProfitScraper.sol#L217
Status	Unresolved

Description

The contract calculates the `referrerAmountlvl2` variable which is only used inside a conditional statement. The statement may or may not resolve to be true. If it does not, then the calculation will be redundant, as this value is not being used elsewhere in the contract.

```
uint referrerAmountlvl2 = (_amount * REFFER_REVARD_2_LVL).div(PERCENT_RATE);
...
if(investors[_referrer].referrer != address(0)) {
    investors[investors[_referrer].referrer].referAmount =
investors[investors[_referrer].referrer].referAmount.add(referrerAmountlvl2);

    payable(investors[_referrer].referrer).transfer(referrerAmountlvl2);
}
```

Recommendation

The team is advised to calculate the `referrerAmountlvl2` variable inside the conditional statement. That way it will improve the efficiency and performance of the source code and reduce the cost of executing it.

CR - Code Repetition

Criticality	Minor / Informative
Location	ProfitScraper.sol#L238,265,354,366
Status	Unresolved

Description

The contract contains repetitive code segments. There are potential issues that can arise when using code segments in Solidity. Some of them can lead to issues like gas efficiency, complexity, readability, security, and maintainability of the source code. It is generally a good idea to try to minimize code repetition where possible.

The contract calculates the claimable reward of the user in multiple instances and then adds the new value to the `claimableAmount` variable. As a result, the same code exists more than once.

```
uint lastRoiTime = block.timestamp -
investors[_owner].lastCalculationDate;
uint allClaimableAmount = (lastRoiTime * investors[_owner].totalLocked *
investors[_owner].APR).div(PERCENT_RATE * REWARD_PERIOD);
```

Recommendation

The team is advised to avoid repeating the same code in multiple places, which can make the contract easier to read and maintain. The authors could try to reuse code wherever possible, as this can help reduce the complexity and size of the contract. For instance, the contract could reuse the `getAllClaimableReward` function, which already exists in the contract, and assign the returning value of the function to the `claimableAmount` variable. That way, the contract will avoid repeating the same code in multiple places.

PRE - Potential Reentrance Exploit

Criticality	Minor / Informative
Location	ProfitScraper.sol#L170
Status	Unresolved

Description

As part of the `deposit` method, the contract transfers ETH to the referrer if the referrer's address is not equal to the zero address. Since the referrer can be any address, the address can be exploited for a re-entrance attack.

```
function deposit(address _referrer) public payable {
    ...
    payable(investors[msg.sender].referrer).transfer(referrerAmountlvl1);
    ...
    payable(investors[_referrer].referrer).transfer(referrerAmountlvl2);
    ...
}
```

Recommendation

The team is advised to prevent the re-entrance exploit as part of the solidity best practices. Some suggestions are:

- Not allow contract addresses to receive funds.
- Add a locker/mutex in the transfer method scope.
- Transfer the funds as the last statement of the transfer method, so that the balance will have been subtracted during the re-entrance phase.

MVW - Multiple Variable Writes

Criticality	Minor / Informative
Location	ProfitScraper.sol#L196,246
Status	Unresolved

Description

There are code segments that could be optimized. A segment may be optimized so that it becomes a smaller size, consumes less memory, executes more rapidly, or performs fewer operations.

During the deposit flow, the contract assigns the same value to the `lastCalculationDate` property twice. Writing to storage multiple times can increase the gas cost drastically.

```
investors[msg.sender].lastCalculationDate = block.timestamp;
```

Recommendation

The team is advised to take these segments into consideration and rewrite them so the runtime will be more performant. That way it will improve the efficiency and performance of the source code and reduce the cost of executing it. A recommended approach would be to remove the first assignment and only keep the last one.

PSU - Potential Subtraction Underflow

Criticality	Minor / Informative
Location	ProfitScraper.sol#L261
Status	Unresolved

Description

The contract subtracts two values, the second value may be greater than the first value if the contract owner misuses the configuration. As a result, the subtraction may underflow and cause the execution to revert.

The `changeAPR` variable is calculated by multiplying the number of days a user has not claimed the reward by 5. The initial `APR` value is 510. This means that if the user claims the reward after 102 days or more then the operation at the code segment below will lead to an underflow.

```
investors[msg.sender].APR -= changeAPR;
```

Recommendation

The team is advised to properly handle the code to avoid underflow subtractions and ensure the reliability and safety of the contract. The contract should ensure that the first value is always greater than the second value. It should add a sanity check in the setters of the variable or not allow executing the corresponding section if the condition is violated.

RSML - Redundant SafeMath Library

Criticality	Minor / Informative
Location	ProfitScraper.sol
Status	Unresolved

Description

SafeMath is a popular Solidity library that provides a set of functions for performing common arithmetic operations in a way that is resistant to integer overflows and underflows.

Starting with Solidity versions that are greater than or equal to 0.8.0, the arithmetic operations revert to underflow and overflow. As a result, the native functionality of the Solidity operations replaces the SafeMath library. Hence, the usage of the SafeMath library adds complexity, and overhead and increases gas consumption unnecessarily.

```
library SafeMath {...}
```

Recommendation

The team is advised to remove the SafeMath library. Since the version of the contract is greater than `0.8.0` then the pure Solidity arithmetic operations produce the same result.

If the previous functionality is required, then the contract could exploit the `unchecked { ... }` statement.

Read more about the breaking change at https://docs.soliditylang.org/en/v0.8.16/080-breaking-changes.html#solidity-v0-8-0-breaking-changes.

IDI - Immutable Declaration Improvement

Criticality	Minor / Informative
Location	ProfitScraper.sol#L157
Status	Unresolved

Description

The contract is using variables that initialize them only in the constructor. The other functions are not mutating the variables. These variables are not defined as `immutable`.

```
devWallet
```

Recommendation

By declaring a variable as immutable, the Solidity compiler is able to make certain optimizations. This can reduce the amount of storage and computation required by the contract, and make it more gas-efficient.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	ProfitScraper.sol#L154,170,293,304,330
Status	Unresolved

Description

The Solidity style guide is a set of guidelines for writing clean and consistent Solidity code. Adhering to a style guide can help improve the readability and maintainability of the Solidity code, making it easier for others to understand and work with.

The followings are a few key points from the Solidity style guide:

1. Use camelCase for function and variable names, with the first letter in lowercase (e.g., myVariable, updateCounter).
2. Use PascalCase for contract, struct, and enum names, with the first letter in uppercase (e.g., MyContract, UserStruct, ErrorEnum).
3. Use uppercase for constant variables and enums (e.g., MAX_VALUE, ERROR_CODE).
4. Use indentation to improve readability and structure.
5. Use spaces between operators and after commas.
6. Use comments to explain the purpose and behavior of the code.
7. Keep lines short (around 120 characters) to improve readability.

```
uint constant bnb100 = 100 * 10 ** 18
address _referrer
uint _amount
address _investor
```

Recommendation

By following the Solidity naming convention guidelines, the codebase increased the readability, and maintainability, and makes it easier to work with.
Find more information on the Solidity documentation
https://docs.soliditylang.org/en/v0.8.17/style-guide.html#naming-convention.

L07 - Missing Events Arithmetic

Criticality	Minor / Informative
Location	ProfitScraper.sol#L248
Status	Unresolved

Description

Events are a way to record and log information about changes or actions that occur within a contract. They are often used to notify external parties or clients about events that have occurred within the contract, such as the transfer of tokens or the completion of a task.

It's important to carefully design and implement the events in a contract, and to ensure that all required events are included. It's also a good idea to test the contract to ensure that all events are being properly triggered and logged.

```
totalInvested = totalInvested.add(_amount)
```

Recommendation

By including all required events in the contract and thoroughly testing the contract's functionality, the contract ensures that it performs as intended and does not have any missing events that could cause issues with its arithmetic.

L13 - Divide before Multiply Operation

Criticality	Minor / Informative
Location	ProfitScraper.sol#L232,235,344,365
Status	Unresolved

Description

It is important to be aware of the order of operations when performing arithmetic calculations. This is especially important when working with large numbers, as the order of operations can affect the final result of the calculation. Performing divisions before multiplications may cause a loss of prediction.

```
uint add5 = ((block.timestamp - investors[_owner].lastCalculationDate) /
(1 days))
investors[_owner].APR += add5 * 5
```

Recommendation

To avoid this issue, it is recommended to carefully consider the order of operations when performing arithmetic calculations in Solidity. It's generally a good idea to use parentheses to specify the order of operations. The basic rule is that the multiplications should be prior to the divisions.

L15 - Local Scope Variable Shadowing

Criticality	Minor / Informative
Location	ProfitScraper.sol#L343
Status	Unresolved

Description

Local scope variable shadowing occurs when a local variable with the same name as a variable in an outer scope is declared within a function or code block. When this happens, the local variable "shadows" the outer variable, meaning that it takes precedence over the outer variable within the scope in which it is declared.

```
address _owner = firstDeposits[i].owner
```

Recommendation

It's important to be aware of shadowing when working with local variables, as it can lead to confusion and unintended consequences if not used correctly. It's generally a good idea to choose unique names for local variables to avoid shadowing outer variables and causing confusion.

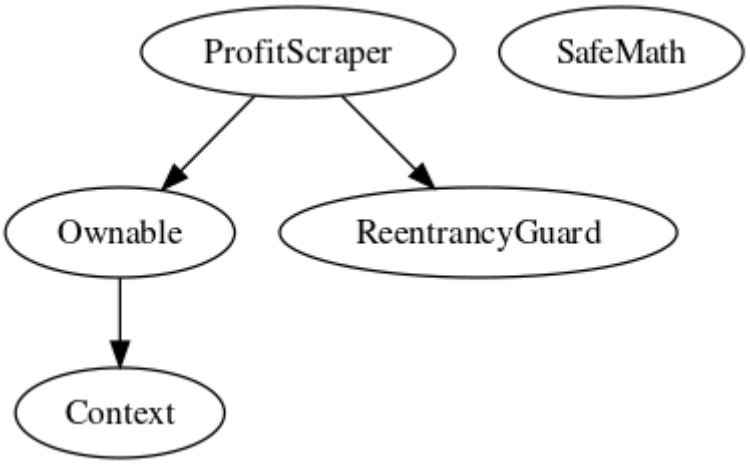
Functions Analysis

Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
Context	Implementation			
	_msgSender	Internal		
Ownable	Implementation	Context		
		Public	✓	-
	owner	Public		-
	transferOwnership	Public	✓	onlyOwner
	_transferOwnership	Internal	✓	
ReentrancyGuard	Implementation			

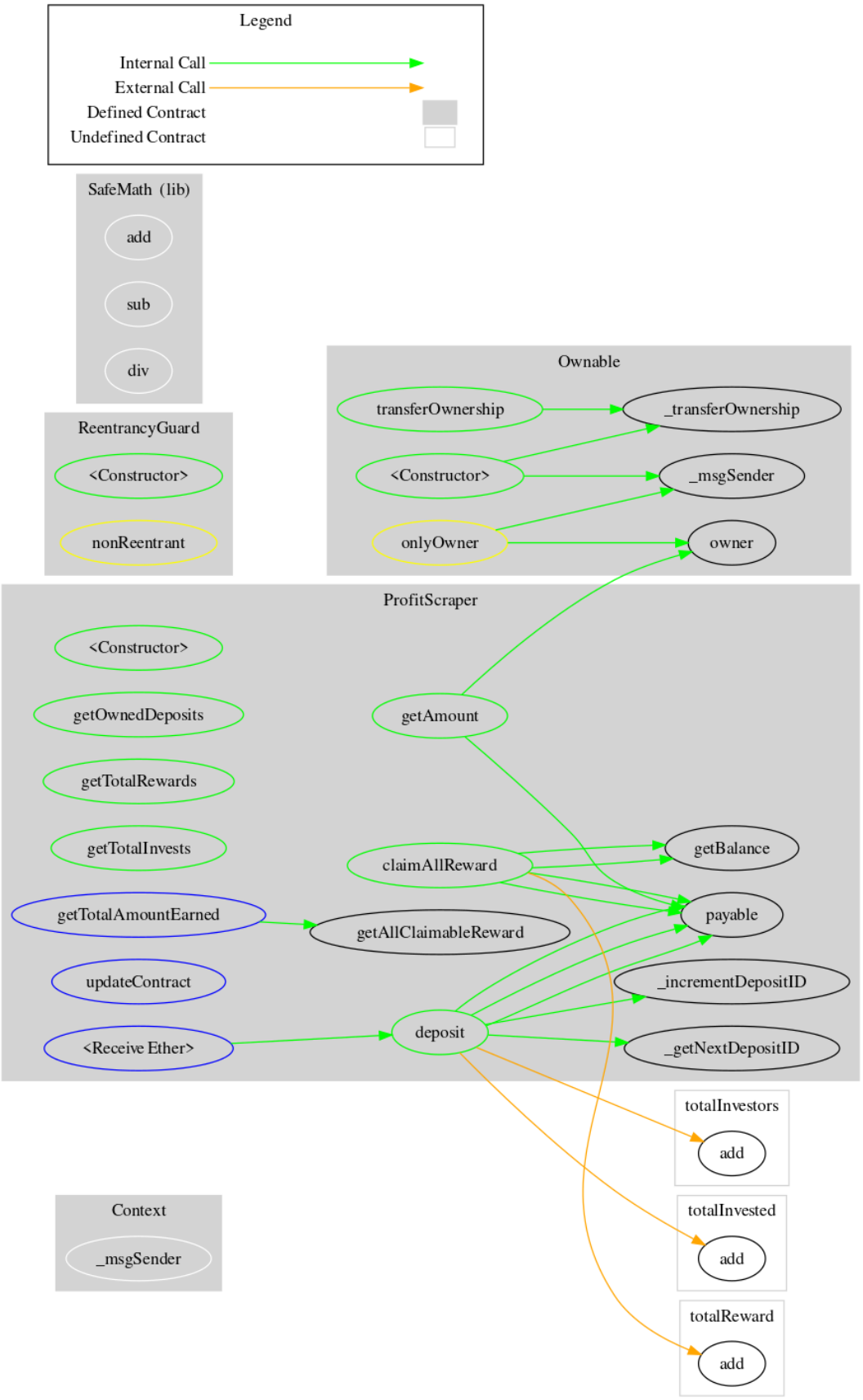
		Public	✓	-
SafeMath	Library			
	add	Internal		
	sub	Internal		
	div	Internal		
ProfitScraper	Implementation	Ownable, ReentrancyGuard		
		Public	✓	-
	_getNextDepositID	Private		
	_incrementDepositID	Private	✓	
	deposit	Public	Payable	-
	claimAllReward	Public	✓	nonReentrant
	getAmount	Public	Payable	onlyOwner

	getOwnedDeposits	Public		-
	getAllClaimableReward	Public		-
	getBalance	Public		-
	getTotalRewards	Public		-
	getTotalInvests	Public		-
	getTotalAmountEarned	External		-
	updateContract	External	✓	onlyOwner
		External	Payable	-

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
SafeMath (lib)
add
sub
div
ReentrancyGuard
<Constructor>
nonReentrant
Ownable
transferOwnership
_transferOwnership
<Constructor>
_msgSender
onlyOwner
owner
ProfitScraper
<Constructor>
getOwnedDeposits
getTotalRewards
getTotalInvests
getTotalAmountEarned
updateContract
<Receive Ether>
getAmount
claimAllReward
getAllClaimableReward
deposit
getBalance
payable
_incrementDepositID
_getNextDepositID
totalInvestors
add
totalInvested
add
totalReward
add
Context
_msgSender

Summary

ProfitScraper contract implements a rewards and staking mechanism. This audit investigates security issues, business logic concerns and potential improvements.

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The Cyberscope team

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