Cyberscope

Audit Report

zkPiggyAI

May 2023

Network	BSC
Address	0x81E1291fcbc7f13557d38D710A776eb090b38669
Audited by	© cyberscope

Table of Contents

Review

Contract Name	zkPiggyAI
Compiler Version	v0.8.7+commit.e28d00a7
Optimization	200 runs
Explorer	https://bscscan.com/address/0x81e1291fcbc7f13557d38d710a776eb090b38669
Address	0x81e1291fcbc7f13557d38d710a776eb090b38669
Network	BSC
Symbol	zkPAI
Decimals	18
Total Supply	1,000,000,000

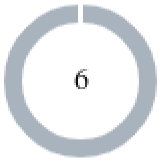
Audit Updates

Initial Audit	10 May 2023

Source Files

Filename	SHA256
zkPiggyAI.sol	794de7a56b5aff117f7ab5299625f3be0b6e4a98478486abcc88611bab0965eb

Findings Breakdown



●	Critical	0
●	Medium	0
●	Minor / Informative	6

Severity		Unresolved	Acknowledged	Resolved	Other
●	Critical	0	0	0	0
●	Medium	0	0	0	0
●	Minor / Informative	6	0	0	0

Analysis

🔴 Critical 🟡 Medium ⚪ Minor / Informative 🔵 Pass

Severity	Code	Description	Status
⚪	ST	Stops Transactions	Unresolved
🔵	OCTD	Transfers Contract's Tokens	Passed
🔵	OTUT	Transfers User's Tokens	Passed
🔵	ELFM	Exceeds Fees Limit	Passed
🔵	ULTW	Transfers Liquidity to Team Wallet	Passed
🔵	MT	Mints Tokens	Passed
🔵	BT	Burns Tokens	Passed
🔵	BC	Blacklists Addresses	Passed

ST - Stops Transactions

Criticality	Minor / Informative
Location	zkPiggyAI.sol#L147
Status	Unresolved

Description

The contract owner has the authority to stop the transactions for all users. The owner may take advantage of it by calling the `pauseContract` function.

```
function pauseContract() public onlyOwner{
    _pause();
}
```

Recommendation

The team should carefully manage the private keys of the owner's account. We strongly recommend a powerful security mechanism that will prevent a single user from accessing the contract admin functions. Some suggestions are:

- Introduce a time-locker mechanism with a reasonable delay.
- Introduce a multi-sign wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.
- Renouncing the ownership will eliminate the threats but it is non-reversible.

Diagnostics

🔴 Critical 🟠 Medium ● Minor / Informative

Severity	Code	Description	Status
●	RSML	Redundant SafeMath Library	Unresolved
●	L04	Conformance to Solidity Naming Conventions	Unresolved
●	L06	Missing Events Access Control	Unresolved
●	L09	Dead Code Elimination	Unresolved
●	L16	Validate Variable Setters	Unresolved

RSML - Redundant SafeMath Library

Criticality	Minor / Informative
Location	zkPiggyAI.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.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	zkPiggyAI.sol#L52,179
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.

```
contract zkPiggyAI is IBEP20 {
    using SafeMath for uint256;

       modifier onlyOwner() {
        require(msg.sender==owner, "Only Call by Owner");
        _;
...
        return _symbol;
    }

    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

...
```

Recommendation

By following the Solidity naming convention guidelines, the codebase increased the readability, 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.

L06 - Missing Events Access Control

Criticality	Minor / Informative
Location	zkPiggyAI.sol#L180
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. There are functions that have no event emitted, so it is difficult to track off-chain changes.

```
owner=_newonwer
```

Recommendation

To avoid this issue, 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.

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.

L09 - Dead Code Elimination

Criticality	Minor / Informative
Location	zkPiggyAI.sol#L214,230
Status	Unresolved

Description

In Solidity, dead code is code that is written in the contract, but is never executed or reached during normal contract execution. Dead code can occur for a variety of reasons, such as:

- Conditional statements that are always false.
- Functions that are never called.
- Unreachable code (e.g., code that follows a return statement).

Dead code can make a contract more difficult to understand and maintain, and can also increase the size of the contract and the cost of deploying and interacting with it.

```
function _burn(address account, uint256 value) internal whenNotPaused {
        require(account != address(0), "ERC20: burn from the zero
address");

        _totalSupply = _totalSupply.sub(value);
        _balances[account] = _balances[account].sub(value);
        emit Transfer(account, address(0), value);
    }

function _burnFrom(address account, uint256 amount) internal whenNotPaused
{
        _burn(account, amount);
        _approve(account, msg.sender,
_allowances[account][msg.sender].sub(amount));
    }
```

Recommendation

To avoid creating dead code, it's important to carefully consider the logic and flow of the contract and to remove any code that is not needed or that is never executed. This can help improve the clarity and efficiency of the contract.

L16 - Validate Variable Setters

Criticality	Minor / Informative
Location	zkPiggyAI.sol#L180
Status	Unresolved

Description

The contract performs operations on variables that have been configured on user-supplied input. These variables are missing of proper check for the case where a value is zero. This can lead to problems when the contract is executed, as certain actions may not be properly handled when the value is zero.

```
owner=_newonwer
```

Recommendation

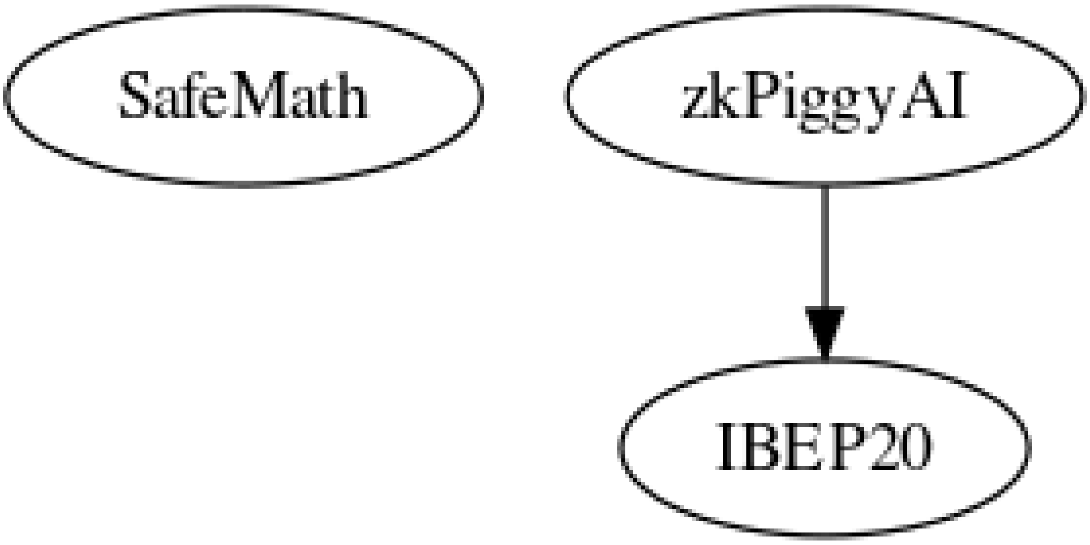
By adding the proper check, the contract will not allow the variables to be configured with zero value. This will ensure that the contract can handle all possible input values and avoid unexpected behavior or errors. Hence, it can help to prevent the contract from being exploited or operating unexpectedly.

Functions Analysis

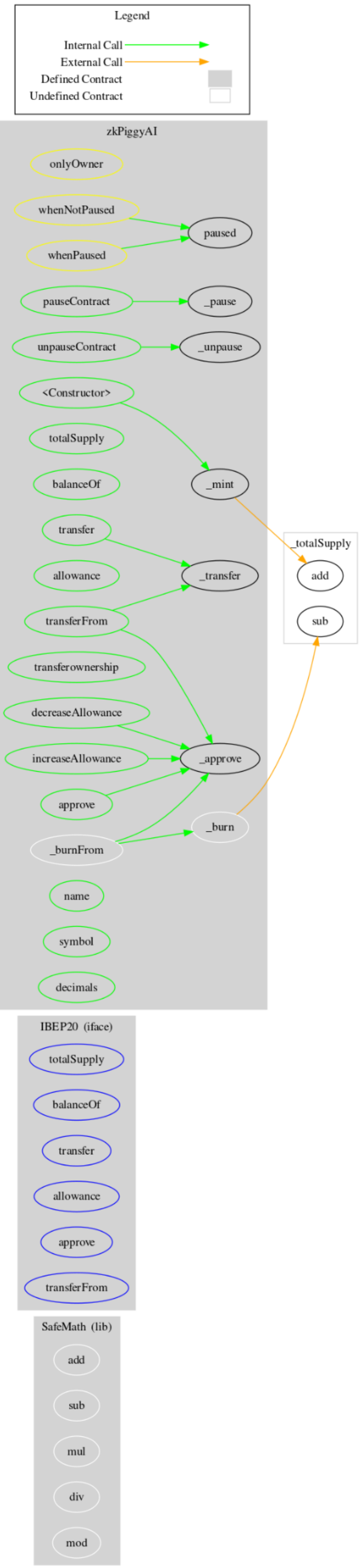
Contract	Type	Bases		
	Function Name	Visibility	Mutability	Modifiers
SafeMath	Library			
	add	Internal		
	sub	Internal		
	mul	Internal		
	div	Internal		
	mod	Internal		
IBEP20	Interface			
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
zkPiggyAI	Implementation	IBEP20		
		Public	✓	-
	paused	Public		-

	_pause	Internal	✓	whenNotPaused
	_unpause	Internal	✓	whenPaused
	pauseContract	Public	✓	onlyOwner
	unpauseContract	Public	✓	onlyOwner
	totalSupply	Public		-
	balanceOf	Public		-
	transfer	Public	✓	whenNotPaused
	allowance	Public		-
	approve	Public	✓	-
	transferownership	Public	✓	onlyOwner
	transferFrom	Public	✓	whenNotPaused
	increaseAllowance	Public	✓	whenNotPaused
	decreaseAllowance	Public	✓	whenNotPaused
	_transfer	Internal	✓	whenNotPaused
	_mint	Internal	✓	
	_burn	Internal	✓	whenNotPaused
	_approve	Internal	✓	whenNotPaused
	_burnFrom	Internal	✓	whenNotPaused
	name	Public		-
	symbol	Public		-
	decimals	Public		-

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
zkPiggyAI
onlyOwner
whenNotPaused
paused
whenPaused
pauseContract
_pause
unpauseContract
_unpause
<Constructor>
totalSupply
_mint
balanceOf
transfer
_totalSupply
add
allowance
_transfer
transferFrom
sub
transferownership
decreaseAllowance
increaseAllowance
_approve
approve
_burn
_burnFrom
name
symbol
decimals
IBEP20 (iface)
totalSupply
balanceOf
transfer
allowance
approve
transferFrom
SafeMath (lib)
add
sub
mul
div
mod

Summary

zkPiggyAI contract implements a token mechanism. This audit investigates security issues, business logic concerns, and potential improvements. There are some functions that can be abused by the owner like stopping transactions. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats.

Disclaimer

The information provided in this report does not constitute investment, financial or trading advice and you should not treat any of the document's content as such. This report may not be transmitted, disclosed, referred to or relied upon by any person for any purposes nor may copies be delivered to any other person other than the Company without Cyberscope's prior written consent. This report is not nor should be considered an “endorsement” or “disapproval” of any particular project or team. This report is not nor should be regarded as an indication of the economics or value of any “product” or “asset” created by any team or project that contracts Cyberscope to perform a security assessment. This document does not provide any warranty or guarantee regarding the absolute bug-free nature of the technology analyzed, nor do they provide any indication of the technologies proprietors' business, business model or legal compliance. This report should not be used in any way to make decisions around investment or involvement with any particular project. This report represents an extensive assessment process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology.

Blockchain technology and cryptographic assets present a high level of ongoing risk Cyberscope's position is that each company and individual are responsible for their own due diligence and continuous security Cyberscope's goal is to help reduce the attack vectors and the high level of variance associated with utilizing new and consistently changing technologies and in no way claims any guarantee of security or functionality of the technology we agree to analyze. The assessment services provided by Cyberscope are subject to dependencies and are under continuing development. You agree that your access and/or use including but not limited to any services reports and materials will be at your sole risk on an as-is where-is and as-available basis Cryptographic tokens are emergent technologies and carry with them high levels of technical risk and uncertainty. The assessment reports could include false positives false negatives and other unpredictable results. The services may access and depend upon multiple layers of third parties.

About Cyberscope

Cyberscope is a blockchain cybersecurity company that was founded with the vision to make web3.0 a safer place for investors and developers. Since its launch, it has worked with thousands of projects and is estimated to have secured tens of millions of investors' funds.

Cyberscope is one of the leading smart contract audit firms in the crypto space and has built a high-profile network of clients and partners.

The Cyberscope team

https://www.cyberscope.io