Cyberscope

Audit Report

Binate Sown

April 2023

Network	BSC
Address	0x1D6bB803FdFa55FD25E43C3bDBFbF43694Bcec32
Audited by	© cyberscope

Table of Contents

Review

Contract Name	Binate
Compiler Version	v0.8.0+commit.c7dfd78e
Optimization	200 runs
Explorer	https://bscscan.com/address/0x1d6bb803fdfa55fd25e43c3bdbfbf43694bcec32
Address	0x1d6bb803fdfa55fd25e43c3bdbfbf43694bcec32
Network	BSC
Symbol	SOWN
Decimals	18

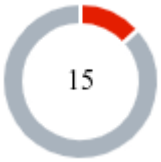
Audit Updates

Initial Audit	17 Apr 2023

Source Files

Filename	SHA256
Binate.sol	caac30f3780b95325bafe8bab415d50491170ceba4fc4ce1b7c9868b3d003c07

Findings Breakdown



Critical	2
Medium	0
Minor / Informative	13

Severity	Unresolved	Acknowledged	Resolved	Other
Critical	0	2	0	0
Medium	0	0	0	0
Minor / Informative	13	0	0	0

Analysis

Critical Medium Minor / Informative Pass

Severity	Code	Description	Status
●	ST	Stops Transactions	Passed
●	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	Acknowledged
●	BT	Burns Tokens	Acknowledged
●	BC	Blacklists Addresses	Passed

MT - Mints Tokens

Criticality	Critical
Location	Binate.sol#L1296
Status	Acknowledged

Description

The contract `Bnt` role has the authority to mint tokens. The `Bnt` role may take advantage of it by calling the `sownFromBnt` function. As a result, the contract tokens will be highly inflated.

```
function sownFromBnt(address to, uint256 value) external onlyBnt returns (bool
_success) {
    _mint(to, value);
    return true;
}
```

Recommendation

The team should carefully manage the private keys of the `Bnt` role account. It is crucial that the Bnt role exercises utmost caution when interacting with the contract.

Team Update

The ownership has been transferred to the `0x3d08b97608b73fa423d52489fd18a5c67d775270` contract and cannot be changed. The team states that it's a dual token protocol, the circulatory supply of Bnt controls the circulatory supply of SOWN. Nobody can mint or burn not even the contract owner. People can convert their Bnt to SOWN or SOWN to Bnt.

BT - Burns Tokens

Criticality	Critical
Location	Binate.sol#L1301
Status	Acknowledged

Description

The contract `Bnt` role has the authority to burn tokens from a specific address. The `Bnt` role may take advantage of it by calling the `bntFromSown` function. As a result, the targeted address will lose the corresponding tokens.

```
function bntFromSown(address tokensOwner, uint256 value)
    external
    virtual
    onlyBnt
    returns (bool _success)
{
    _burn(tokensOwner, value);
    return true;
}
```

Recommendation

The team should carefully manage the private keys of the `Bnt` role account. It is crucial that the Bnt role exercises utmost caution when interacting with the contract.

Team Update

The ownership has been transferred to the `0x3d08b97608b73fa423d52489fd18a5c67d775270` contract and cannot be changed. The team states that it's a dual token protocol, the circulatory supply of Bnt controls the circulatory supply of SOWN. Nobody can mint or burn not even the contract owner. People can convert their Bnt to SOWN or SOWN to Bnt.

Diagnostics

Critical Medium Minor / Informative

Severity	Code	Description	Status
	RSML	Redundant SafeMath Library	Unresolved
	RSK	Redundant Storage Keyword	Unresolved
	IDI	Immutable Declaration Improvement	Unresolved
	L02	State Variables could be Declared Constant	Unresolved
	L04	Conformance to Solidity Naming Conventions	Unresolved
	L06	Missing Events Access Control	Unresolved
	L07	Missing Events Arithmetic	Unresolved
	L09	Dead Code Elimination	Unresolved
	L13	Divide before Multiply Operation	Unresolved
	L16	Validate Variable Setters	Unresolved
	L17	Usage of Solidity Assembly	Unresolved
	L19	Stable Compiler Version	Unresolved
	L20	Succeeded Transfer Check	Unresolved

RSML - Redundant SafeMath Library

Criticality	Minor / Informative
Location	Binate.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.

RSK - Redundant Storage Keyword

Criticality	Minor / Informative
Location	Binate.sol#L139,147,151,159,186,197,201,209
Status	Unresolved

Description

The contract uses the `storage` keyword in a view function. The `storage` keyword is used to persist data on the contract's storage. View functions are functions that do not modify the state of the contract and do not perform any actions that cost gas (such as sending a transaction). As a result, the use of the `storage` keyword in view functions is redundant.

```
Set storage set
AddressSet storage set
```

Recommendation

It is generally considered good practice to avoid using the `storage` keyword in view functions because it is unnecessary and can make the code less readable.

IDI - Immutable Declaration Improvement

Criticality	Minor / Informative
Location	Binate.sol#L928,931,936,937
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`.

```
dexRouter
lpPair
distributor
distributorAddress
```

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.

L02 - State Variables could be Declared Constant

Criticality	Minor / Informative
Location	Binate.sol#L650,663,868,904
Status	Unresolved

Description

State variables can be declared as constant using the constant keyword. This means that the value of the state variable cannot be changed after it has been set. Additionally, the constant variables decrease gas consumption of the corresponding transaction.

```
address WBNB = 0xbb4CdB9CBd36B01bD1cBaEBF2De08d9173bc095c
uint256 public dividendsPerShareAccuracyFactor = 10 ** 36
address public WBNB = 0xbb4CdB9CBd36B01bD1cBaEBF2De08d9173bc095c
uint256 public FEE_DENOMINATOR = 10000
```

Recommendation

Constant state variables can be useful when the contract wants to ensure that the value of a state variable cannot be changed by any function in the contract. This can be useful for storing values that are important to the contract's behavior, such as the contract's address or the maximum number of times a certain function can be called. The team is advised to add the constant keyword to state variables that never change.

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	Binate.sol#L499,570,572,586,641,649,650,694,851,856,867,868,904,907,982,1028,1029,1030,1040,1041,1042,1146,1245,1263,1283,1291
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.

```
function WETH() external pure returns (address);
function DOMAIN_SEPARATOR() external view returns (bytes32);
function PERMIT_TYPEHASH() external pure returns (bytes32);
function MINIMUM_LIQUIDITY() external pure returns (uint256);
address _token
IERC20 BUSD = IERC20(0xe9e7CEA3DedcA5984780Bafc599bD69ADd087D56)
address WBNB = 0xbb4CdB9CBd36B01bD1cBaEBF2De08d9173bc095c
uint256 _minDistribution
uint256 _minPeriod
address _bntContractAddress
address _thetoken
address BUSD = 0xe9e7CEA3DedcA5984780Bafc599bD69ADd087D56
address public WBNB = 0xbb4CdB9CBd36B01bD1cBaEBF2De08d9173bc095c
uint256 public FEE_DENOMINATOR = 10000

...
```

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	Binate.sol#L852,1286
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.

```
bntContract = _bntContractAddress
```

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.

L07 - Missing Events Arithmetic

Criticality	Minor / Informative
Location	Binate.sol#L695,995,1032,1044,1152
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.

```
minPeriod = _minPeriod
swapTokensAtAmount = newAmount
buyMarketingFee = _marketingFee
sellMarketingFee = _marketingFee
distributorGas = gas
```

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.

L09 - Dead Code Elimination

Criticality	Minor / Informative
Location	Binate.sol#L106,116,139,147,151,159,169,176,186,197,201,209,429,434
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 _add(Set storage set, bytes32 value) private returns (bool) {
        if (!_contains(set, value)) {
            set._values.push(value);
            set._indexes[value] = set._values.length;
            return true;
        } else {
            return false;
        }
    }

...
```

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.

L13 - Divide before Multiply Operation

Criticality	Minor / Informative
Location	Binate.sol#L1101,1102,1105,1113,1114,1117,1120
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.

```
tokensForLiquidity += (fees * sellLiquidityFee) / sellTotalFees
fees = (amount * (buyTotalFees)) / FEE_DENOMINATOR
```

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.

L16 - Validate Variable Setters

Criticality	Minor / Informative
Location	Binate.sol#L468,852,943,1292
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 = msgSender
bntContract = _bntContractAddress
marketingAddress = _marketingAddress
BUSD = _thetoken
```

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.

L17 - Usage of Solidity Assembly

Criticality	Minor / Informative
Location	Binate.sol#L218
Status	Unresolved

Description

Using assembly can be useful for optimizing code, but it can also be error-prone. It's important to carefully test and debug assembly code to ensure that it is correct and does not contain any errors.

Some common types of errors that can occur when using assembly in Solidity include Syntax, Type, Out-of-bounds, Stack, and Revert.

```
assembly {
            result := store
        }
```

Recommendation

It is recommended to use assembly sparingly and only when necessary, as it can be difficult to read and understand compared to Solidity code.

L19 - Stable Compiler Version

Criticality	Minor / Informative
Location	Binate.sol#L2
Status	Unresolved

Description

The `^` symbol indicates that any version of Solidity that is compatible with the specified version (i.e., any version that is a higher minor or patch version) can be used to compile the contract. The version lock is a mechanism that allows the author to specify a minimum version of the Solidity compiler that must be used to compile the contract code. This is useful because it ensures that the contract will be compiled using a version of the compiler that is known to be compatible with the code.

```
pragma solidity ^0.8.0;
```

Recommendation

The team is advised to lock the pragma to ensure the stability of the codebase. The locked pragma version ensures that the contract will not be deployed with an unexpected version. An unexpected version may produce vulnerabilities and undiscovered bugs. The compiler should be configured to the lowest version that provides all the required functionality for the codebase. As a result, the project will be compiled in a well-tested LTS (Long Term Support) environment.

L20 - Succeeded Transfer Check

Criticality	Minor / Informative
Location	Binate.sol#L814
Status	Unresolved

Description

According to the ERC20 specification, the transfer methods should be checked if the result is successful. Otherwise, the contract may wrongly assume that the transfer has been established.

```
BUSD.transfer(shareholder, amount)
```

Recommendation

The contract should check if the result of the transfer methods is successful. The team is advised to check the SafeERC20 library from the Openzeppelin library.

Functions Analysis

Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
SafeMath	Library			
	tryAdd	Internal		
	trySub	Internal		
	tryMul	Internal		
	tryDiv	Internal		
	tryMod	Internal		
	add	Internal		
	sub	Internal		
	mul	Internal		
	div	Internal		
	mod	Internal		
	sub	Internal		
	div	Internal		
	mod	Internal		
Context	Implementation			
	_msgSender	Internal		
	_msgData	Internal		

EnumerableSet	Library			
	_add	Private	✓	
	_remove	Private	✓	
	_contains	Private		
	_length	Private		
	_at	Private		
	_values	Private		
	adds	Internal	✓	
	remove	Internal	✓	
	contains	Internal		
	length	Internal		
	at	Internal		
	values	Internal		
IERC20	Interface			
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
	name	External		-

	symbol	External		-
	decimals	External		-
ERC20	Implementation	Context, IERC20		
		Public	✓	-
	name	Public		-
	symbol	Public		-
	decimals	Public		-
	totalSupply	Public		-
	totalBurnt	Public		-
	balanceOf	Public		-
	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	increaseAllowance	Public	✓	-
	decreaseAllowance	Public	✓	-
	_transfer	Internal	✓	
	_mint	Internal	✓	
	_burn	Internal	✓	
	_burnFrom	Internal	✓	
	_createInitialSupply	Internal	✓	
	_approve	Internal	✓	

Ownable	Implementation	Context		
		Public	✓	-
	owner	Public		-
	renounceOwnership	External	✓	onlyOwner
	transferOwnership	Public	✓	onlyOwner
IDexRouter	Interface			
	factory	External		-
	WETH	External		-
	swapExactTokensForETHSupportingFeeOnTransferTokens	External	✓	-
	swapExactETHForTokensSupportingFeeOnTransferTokens	External	Payable	-
	addLiquidityETH	External	Payable	-
	getAmountsOut	External		-
IDexFactory	Interface			
	createPair	External	✓	-
IDexPair	Interface			
	name	External		-
	symbol	External		-
	decimals	External		-
	totalSupply	External		-

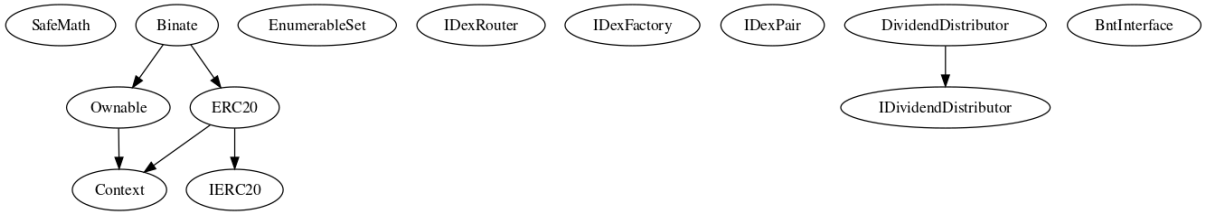
	balanceOf	External		-
	allowance	External		-
	approve	External	✓	-
	transfer	External	✓	-
	transferFrom	External	✓	-
	DOMAIN_SEPARATOR	External		-
	PERMIT_TYPEHASH	External		-
	nonces	External		-
	permit	External	✓	-
	MINIMUM_LIQUIDITY	External		-
	factory	External		-
	token0	External		-
	token1	External		-
	getReserves	External		-
	price0CumulativeLast	External		-
	price1CumulativeLast	External		-
	kLast	External		-
	mint	External	✓	-
	burn	External	✓	-
	swap	External	✓	-
	skim	External	✓	-
	sync	External	✓	-
	initialize	External	✓	-

IDividendDistributor	Interface			
	setDistributionCriteria	External	✓	-
	setShare	External	✓	-
	deposit	External	Payable	-
	process	External	✓	-
	setBntContract	External	✓	-
	updateRewardToken	External	✓	-
DividendDistributor	Implementation	IDividendDistributor		
		Public	✓	-
	setDistributionCriteria	External	✓	onlyToken
	setShare	External	✓	onlyToken
	bntSetShare	External	✓	onlyBnt
	deposit	External	Payable	onlyToken
	process	External	✓	onlyToken
	bntProcess	External	✓	onlyBnt
	shouldDistribute	Internal		
	distributeDividend	Internal	✓	
	claimDividend	External	✓	-
	getUnpaidEarnings	Public		-
	getCumulativeDividends	Internal		
	addShareholder	Internal	✓	

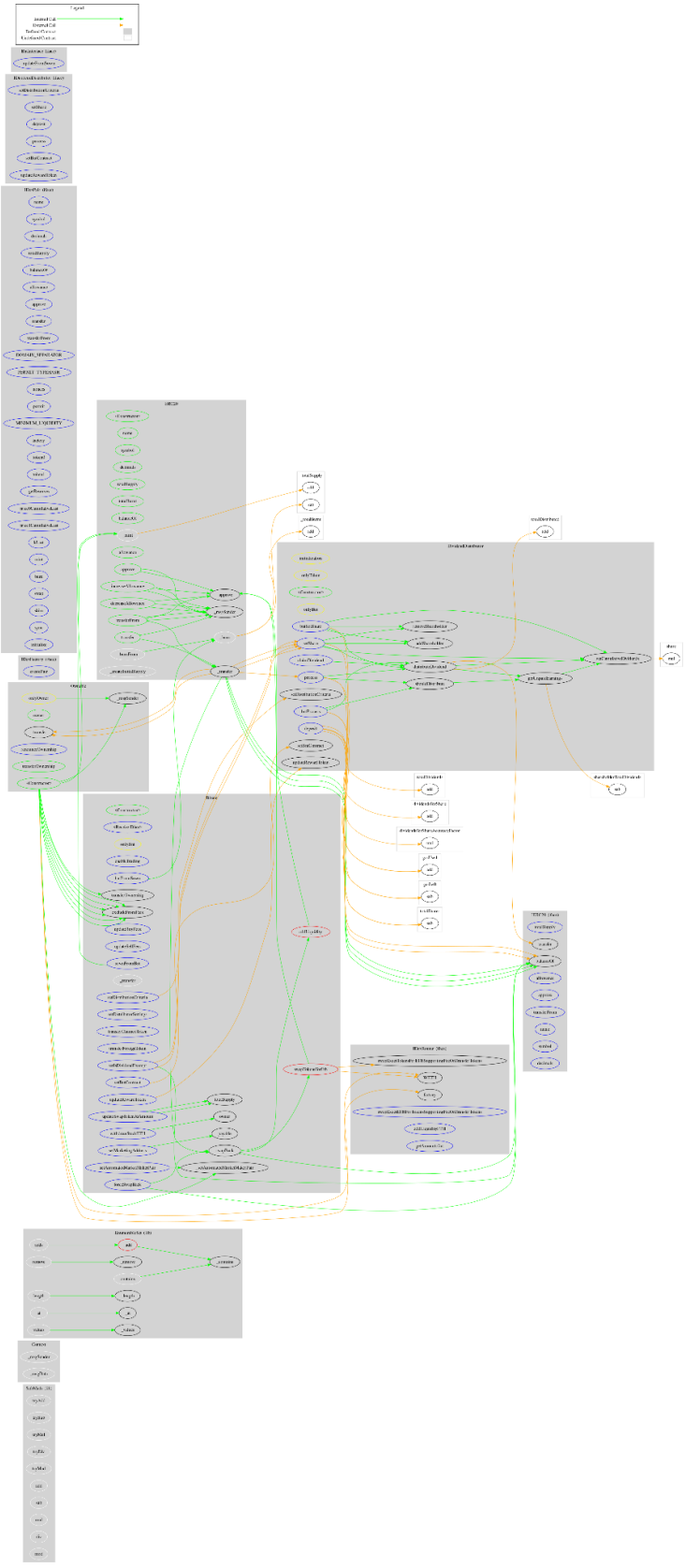
	removeShareholder	Internal	✓	
	setBntContract	External	✓	onlyToken
	updateRewardToken	External	✓	onlyToken
BntInterface	Interface			
	updateFromSown	External	✓	-
Binate	Implementation	ERC20, Ownable		
		Public	Payable	ERC20
		External	Payable	-
	enableTrading	External	✓	onlyOwner
	updateSwapTokenAtAmount	External	✓	onlyOwner
	setIsDividendExempt	External	✓	onlyOwner
	setAutomatedMarketMakerPair	External	✓	onlyOwner
	_setAutomatedMarketMakerPair	Private	✓	
	updateBuyFees	External	✓	onlyOwner
	updateSellFees	External	✓	onlyOwner
	excludeFromFees	Public	✓	onlyOwner
	_transfer	Internal	✓	
	setDistributionCriteria	External	✓	onlyOwner
	setDistributorSettings	External	✓	onlyOwner
	swapTokensForEth	Private	✓	
	addLiquidity	Private	✓	

	swapBack	Private	✓	
	transferClaimedToken	External	✓	onlyBnt
	transferForeignToken	External	✓	onlyOwner
	withdrawStuckETH	External	✓	onlyOwner
	setMarketingAddress	External	✓	onlyOwner
	forceSwapBack	External	✓	onlyOwner
	setBntContract	External	✓	onlyOwner
	updateRewardToken	External	✓	onlyOwner
	sownFromBnt	External	✓	onlyBnt
	bntFromSown	External	✓	onlyBnt

Inheritance Graph



Flow Graph



Summary

Binate Sown 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 Bnt contract role like minting tokens and burning tokens from any address. If the contract Bnt role abuses the mint functionality, then the contract will be highly inflated. If the contract Bnt role abuses the burn functionality, then the users could lose their tokens. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats. There is also a limit of max 5% fees.

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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