Cyberscope

Audit Report

Dual Pools Trend Token

April 2023

Github https://github.com/JavisJL/dualpools/tree/main/TrendTokenAudit

Commit ee03d8eeb0b412dd944ea4aeb61fbf26aa2aca5e

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Table of Contents

Review

Repository	https://github.com/JavisJL/dualpools
Commit	ee03d8eeb0b412dd944ea4aeb61fbf26aa2aca5e

Audit Updates

Initial Audit	16 Apr 2023 https://github.com/cyberscope-io/audits/blob/main/xdp/v1/trendToken.pdf
Corrected Phase 2	24 Apr 2023

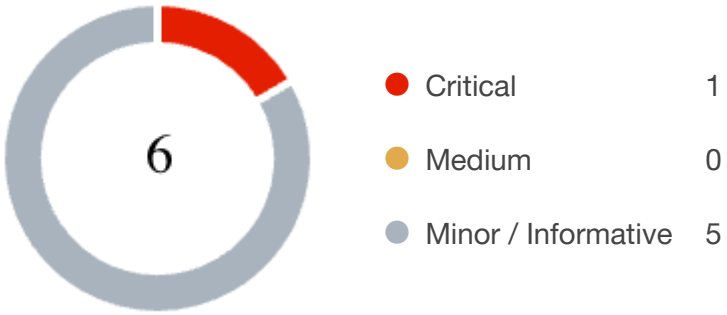
Source Files

Filename	SHA256
AggregatorV2V3Interface.sol	a5523f8072d46e9a121390beefd22cf9b78d00efec1e1f1274c010cacb019495
CompStorageTT.sol	3e0959f600bd1eb11cb54a9a98df75244cbce6ba91f38fcd2c8971c6680a5242
CompTT.sol	7b277ae21ad474553412b708bfdf7873d5bb5231d1fbf39cf74d621e4b70ecb7
DualPool.sol	47b77b66e41e241a618bb086fe24dc7083d73ef61054828f83cf323d7b1f2c12
DualPoolStorage.sol	d0b5fdd0579d88997b23be8a436bddbf0dbdc69429a7a96c1295d83a5e73a306
ERC20.sol	6b52089f84c5f7e6fbf7f2219ebe31f43e104ce89b44b28a72a4371c19a847e6
ERC20Detailed.sol	edbc6746642b1fdb6066c5dacd1c3756f04c4af57521594fbcb8864c61e5b648
IChainlinkOracle.sol	27cac8821c279a09cdf6b3e0e1985867db49ef35cce6763df8154daafb77a31e
ICompDP.sol	1fbb60793e8bf070e6e70f05d3e9c67557ec73aa637630146f4cdc4206073b48
ICompTT.sol	b71da5599b0e6bbe9fc1d163880a8c3d0290f9d315c97ac212f99ecde715e818
IERC20.sol	23221a896472eeee23d71500d71f40bcce31112b9198389310d2e7ff7d0be093
IIncentiveModelSimple.sol	a3a4ee3d50e418aa6163a3a63c55e451941a0f931848fb259158b41cc489f520

IncentiveModelSimple.sol	a514d85096a1e7c7ef209478aba46d6f4c1bac7dfd404f63893b037e9746011d
IPancakeRouter.sol	c61657a8afd44ac0167d429ff2a1dd6390631da7006e3d60e92af45be968c3cc
ITrendToken.sol	23405749543ca2ef8bd05b3ff2599c0c026d519f6ba4f47569fcb047f80d1941
ITrendTokenTkn.sol	b3286f0e63b4fb4f77cc7d012fff28c06b6390686542f9c107a65e3b9549137e
IVBep20.sol	4388fcfcdf67909073a1af7353687e653b9180653281418aced5a607afcc78b8
IVBNB.sol	53487fc7336311df84bdb8faa5d7999ae61b48b9f72f462ceae53dc34f631435
IXTT.sol	36ff8e43a69fc4b0da21352c652aee0b733c841be27fcf3035d9583ea6519ac7
Lib.sol	d422b07cb39ad6c13941d82d5d9dc524583a85640fb441afb997fc829dfb49a7
SafeMath.sol	4a47d15402f20ec26b0fe15d61f4f6e946e7949b7beaa6398957b5cadee42931
SignedSafeMath.sol	533257d850b02a32792adfa2e02af99e926a1b08af501b37eae82cc174b9c06a
TrendToken.sol	0f41568f1c520e727717aff33f022fa1a61acbcfd1ee3371b4479759135add5a
TrendTokenStorage.sol	2c3736dd21656a822cac8a4c82656aac3c1dfb823481e15ff2ecd6c8acf21899
TrendTokenTkn.sol	7113aa9235ca431ea743ba70f36e00c68cea3de39c8ac935986923d9244445cf
UniTT.sol	57442216e7dc8993ab5fe99cb5699b23865cd42fd0f8b983e87746de31e32003

XTTgov.sol	11160e5e1becd7e1f6f43af23b635a24592ade0b1627b4d79252ff64ed6e292b

Findings Breakdown



Severity	Unresolved	Acknowledged	Resolved	Other
Critical	0	1	0	0
Medium	0	0	0	0
Minor / Informative	2	3	0	0

Diagnostics

Critical Medium Minor / Informative

Severity	Code	Description	Status
●	UIA	Unsafe Indexing Assumption	Acknowledged
●	MT	Mints Tokens	Acknowledged
●	FO	For-Lopp Optimization	Unresolved
●	L02	State Variables could be Declared Constant	Acknowledged
●	L04	Conformance to Solidity Naming Conventions	Acknowledged
●	L19	Stable Compiler Version	Unresolved

UIA - Unsafe Indexing Assumption

Criticality	Critical
Status	Acknowledged

Description

The contract assumes that the `desiredAllocations` indexes are identical to the market's tokens indexes. This assumption could be broken if the `desiredAllocations` or `market's tokens` change without updating the corresponding structures. As a result, the entire contract will yield to an unexpected state.

```
desiredAllocations = _allocations;
emit SetDesiredAllocationsFresh(getMarkets(), oldAllocations,
desiredAllocations);

//...

if (IVBep20(dTokens[i]) == dTokensInOut[0]) {
    tokenEquityInOut[0] = conVals[i].add(colVals[i]);
    desiredAllocations[0] = desiredAllocations[i];
}
```

Recommendation

The team is advised to carefully investigate the circumstances where the indexes could be diverse. A recommended way could be to allow only synchronized modifications of these properties.

Team Update

Trading bot will ensure proper index when changing order of markets (tokens) or adjusting desired allocations.

MT - Mints Tokens

Criticality	Minor / Informative
Location	DualPool.sol#L298
Status	Acknowledged

Description

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

```
function _supplyCollateral(IERC20 _depositBep20, uint supplyAmt)
onlyManager external {
    IVBep20 dToken = dTokenSupportedRequire(_depositBep20);
    collateralSupply(_depositBep20,dToken, supplyAmt);
}
```

Recommendation

The team should carefully manage the private keys and the implementation of the trading bot 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.

Team Update

More secure onlyManager keys are used. Low security risk as this only allows for supplying or redeeming collateral.

FO - For-Lopp Optimization

Criticality	Minor / Informative
Location	CompTT.sol#L305
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.

The trendSupportedToken mechanism could be improved. The for-loop iterates the whole array even if the trend token is already found.

```
function trendTokenSupported(ITrendToken trendToken) internal view
returns(bool) {
    bool isSupported = false;
    for (uint i = 0; i < allTrendTokens.length; i ++) {
        if (allTrendTokens[i] == trendToken) {
            isSupported = true;
        }
    }
    return isSupported;
}
```

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.

It is recommended to return the boolean when the if statement `allTrendTokens[i] == trendToken` evaluates to true.

```
if (allTrendTokens[i] == trendToken) {
    return true;
}
```

L02 - State Variables could be Declared Constant

Criticality	Minor / Informative
Location	TrendTokenStorage.sol#L97,104,118,125,131,137,143,150,156,162,169,176,183,197,205,213,223DualPoolStorage.sol#L16,22,28,34,40CompStorageTT.sol#L13,18,23,28,38,87,93
Status	Acknowledged

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.

```
bool internal _notEntered
uint public contractFactor = 0.90e18
uint public maxSupply = 1000e18
address public manager
address public tradingBot
address payable public feeRecipient
IIncentiveModelSimple public incentiveModel
bool public trendTokenPaused = false
uint public referralReward = 0.40e18
uint public performanceFee = 0.10e18
uint public trendTokenRedeemBurn = 0.50e18
uint public accruedXDPtoFeeRecipient = 0.50e18
uint public maxDisableTokenValue = 1e18
ITrendTokenTkn public trendToken

...
```

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.

Team Update

The variables are changeable, but not in the files they are in. For example, TrendToken.sol changes variables in TrendTokenStorage.sol

L04 - Conformance to Solidity Naming Conventions

Criticality	Minor / Informative
Location	TrendTokenTkn.sol#L31,35TrendTokenStorage.sol#L97TrendToken.sol#L93,149,180,211,227,240,255,267,277,288,298,307,321,333,347,377,387,403,414,434,443,457,476,503,526,535,552,592,621,684,714,760,797,822,843,881,889,910,929,951,987,1047,1106,1156Lib.sol#L27,32DualPool.sol#L51,70,82,95,105,116,128,144CompTT.sol#L201,210,219,231,255,293,333,353,362,372,382,393,404
Status	Acknowledged

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.

```
address _recipient
uint256 _amount
bool internal _notEntered
address _owner
address _compTT

...
```

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.

Team Update

Only a couple changed. We will acknowledge and tolerate the rest

L19 - Stable Compiler Version

Criticality	Minor / Informative
Location	TrendTokenTkn.sol#L2TrendTokenStorage.sol#L2TrendToken.sol#L2Lib.sol#L2ITrendTokenTkn.sol#L2ITrendToken.sol#L2ICompTT.sol#L2ICompDP.sol#L2DualPoolStorage.sol#L2DualPool.sol#L2CompTT.sol#L2CompStorageTT.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 ^0.5.16;
```

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.

Functions Analysis

Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
UnitrollerAdminStorage	Implementation			
ComptrollerStorage	Implementation	UnitrollerAdminStorage		
CompTT	Implementation	ComptrollerStorage		
		Public	✓	-
	ensureAdmin	Private		
	ensureNonzeroAddress	Private		
	depositOrRedeemAllowed	External		onlyProtocolAllowed
	tradeAllowed	External		onlyProtocolAllowed
	getBlockNumber	External		-
	getXVSAddress	External		-
	returnDToken	External		onlyProtocolAllowed
	trendTokenIsListed	External		-
	trendTokenIsActive	External		-
	trendTokenIsTrade	External		-
	trendTokenAllowedDualPools	External		-
	trendTokenMaxTradeFee	External		-

	trendTokenMaxPerformanceFee	External		-
	trendTokenMaxDisableValue	External		-
	_become	External	✓	-
	_setProtocolPaused	External	✓	validPauseState
	_setMintPaused	External	✓	validPauseState
	_setPriceOracle	External	✓	-
	_setPauseGuardian	External	✓	-
	supportTokenFresh	Internal	✓	
	_supportToken	External	✓	-
	trendTokenSupported	Internal		
	_supportTrendTokenFresh	Internal	✓	
	_supportTrendToken	External	✓	-
	_newIsActive	External	✓	onlySupportedTrendTokens
	_newIsTrade	External	✓	onlySupportedTrendTokens
	_newAllowedDualPools	External	✓	onlySupportedTrendTokens
	_newMaxTradeFee	External	✓	onlySupportedTrendTokens
	_newMaxPerformanceFee	External	✓	onlySupportedTrendTokens
	_newMaxDisableValue	External	✓	onlySupportedTrendTokens
DualPoolIntegration	Implementation	DualPoolStorage		
		Public	✓	-
		External	Payable	-

	screenshot	Internal		
	getMarkets	Internal		
	priceBEP20	Internal		
	exchangeVBEP20	Internal		
	enableCol	Internal	✓	
	disableCol	Internal	✓	
	tokenEntered	Internal		
	collateralSupply	Internal	✓	
	collateralRedeem	Internal	✓	
DualPoolStorage	Implementation			
ICompDP	Interface			
	enterMarkets	External	✓	-
	claimXDP	External	✓	-
	venusAccrued	External		-
	getAssetsIn	External		-
	markets	External		-
	getAccountLiquidity	External		-
	closeFactorMantissa	External		-
	exitMarket	External	✓	-
	getHypotheticalAccountLiquidity	External		-
	checkMembership	External		-

	iUSDaddress	External		-
ICompTT	Implementation			
	oracle	External		-
	protocolPaused	External		-
	depositOrRedeemAllowed	External		-
	tradeAllowed	External		-
	returnDToken	External		-
	trendTokenIsListed	External		-
	trendTokenIsActive	External		-
	trendTokenIsTrade	External		-
	trendTokenAllowedDualPools	External		-
	trendTokenMaxTradeFee	External		-
	trendTokenMaxPerformanceFee	External		-
	trendTokenMaxDisableValue	External		-
ITrendToken	Interface			
	incentiveModel	External		-
	storedEquity	External		-
	trendToken	External		-
	performanceFee	External		-
	lastRebalance	External		-
	isTrendToken	External		-

	dBNB	External		-
	priceExt	External		-
	trendTokenToUSD	External		-
	trendTokenOutExternal	External		-
	trendTokenInExternal	External		-
ITrendTokenTkn	Interface			
	mint	External	✓	-
	name	External		-
	burn	External	✓	-
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transfersFrom	External	✓	-
Lib	Library			
	pathGenerator2	Internal		
	getValue	Internal		
	getAssetAmt	Internal		
TrendToken	Implementation	DualPoolIntegration,		

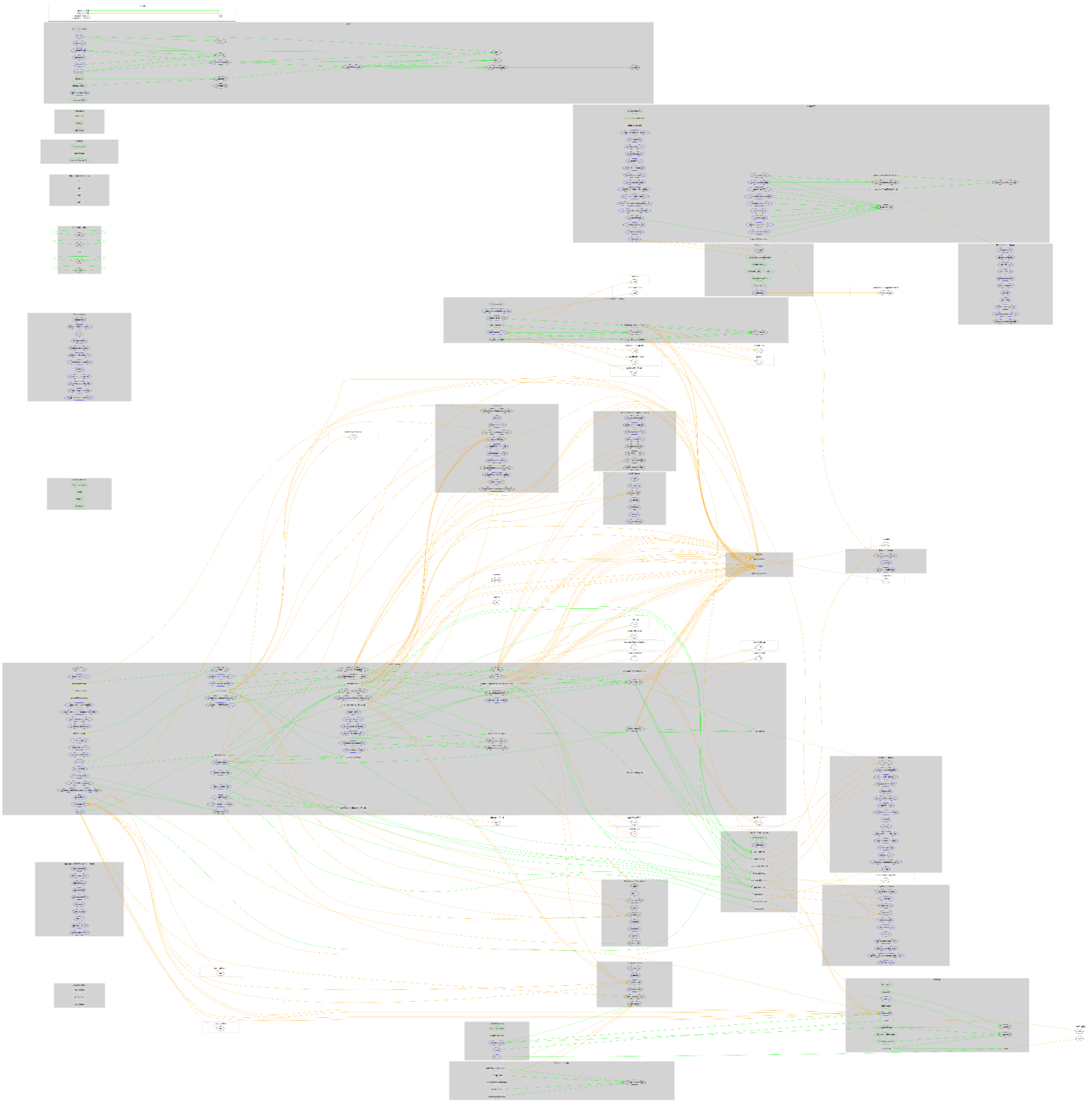
		TrendTokenStorage		
		Public	✓	DualPoolIntegration
		External	Payable	-
	onlyModifiers	Internal		
	_updateCompAndModels	External	✓	onlyManager
	_updateManagerRecipientAndBot	External	✓	onlyManager
	_newPerformanceFee	External	✓	onlyManager
	_updateFeeDistribution	External	✓	onlyManager
	_setReferralReward	External	✓	onlyManager
	_maxDisableValue	External	✓	onlyManager
	_setMaxSupply	External	✓	onlyManager
	setContractFactor	Internal	✓	
	_setContractFactor	External	✓	onlyManager
	_supplyCollateral	External	✓	onlyManager
	_redeemCollateral	External	✓	onlyManager
	_depositsDisabled	External	✓	onlyTradingBot
	_pauseTrendToken	External	✓	onlyTradingBot
	dTokenSupportedRequire	Internal		
	_setDesiredAllocationsFresh	Internal	✓	
	_setDesiredAllocations	External	✓	onlyTradingBot
	_enableTokens	External	✓	onlyTradingBot
	checkActiveToken	Internal		
	_disableToken	External	✓	onlyTradingBot

	_redeemPerformanceFee	External	✓	onlyManager
	_reduceTrendTokenReservesToRecipient	External	✓	onlyManager
	_redeemXDP	External	✓	onlyManager
	_reduceXDPtoRecipient	External	✓	onlyManager
	priceExt	External		-
	balanceXDPext	External		-
	trendTokenToUSDext	External		-
	trendTokenOutExternal	External		-
	trendTokenInExternal	External		-
	storedEquityExternal	External		-
	tokenInfoExternal	External		-
	tradeInfoExt	External		-
	calculatePerformanceFee	Internal		
	sendPerformanceFee	Internal	✓	
	balanceXDP	Internal		
	contractBal	Internal		
	storedEquity	Internal		
	trendTokenToUSD	Internal		
	trendTokenToUSD	Internal		
	tokenInfo	Internal		
	tokenEquityVal	Internal		
	distributeReferralReward	Internal	✓	
	trendTokenOutCalculations	Internal		

	depositFresh	Internal	✓	pausedTrendToken
	depositBNB	External	Payable	nonReentrant
	deposit	External	✓	nonReentrant
	sendUnderlyingOut	Internal	✓	
	trendTokenInCalculations	Internal		
	redeemFresh	Internal	✓	pausedTrendToken
	redeem	External	✓	nonReentrant
	tradeInfo	Internal		
	executeTrade	Internal	✓	pausedTrendToken
	swapExactTokensForTokens	External	✓	nonReentrant
	swapExactETHForTokens	External	Payable	nonReentrant
	returnUnderlying	Internal		
	singleSupplyAndRedeemRebalance	Internal	✓	
	publicSupplyAndRedeemRebalance	External	✓	pausedTrendToken
TrendTokenStorage	Implementation			
TrendTokenTkn	Implementation	ERC20, ERC20Detailed		
		Public	✓	ERC20Detailed
	mint	External	✓	requireMinter
	burn	External	✓	-
	transfersFrom	External	✓	-

Inheritance Graph

Flow Graph



Summary

Dual Pools contract implements a token mechanism. This audit investigates security issues, business logic concerns, and potential improvements.

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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