Cyberscope

Audit Report

Arcadify

July 2023

SHA 256 4cd8f367be62a04423e9d7c73511b0214fafcc0b0e53c1b00ff511c92e93c1a0

Audited by © cyberscope

Analysis

Critical Medium Minor / Informative Pass

Severity	Code	Description	Status
●	ST	Stops Transactions	Unresolved
●	OTUT	Transfers User's Tokens	Passed
●	ELFM	Exceeds Fees Limit	Unresolved
●	MT	Mints Tokens	Passed
●	BT	Burns Tokens	Passed
●	BC	Blacklists Addresses	Unresolved

Diagnostics

Critical Medium Minor / Informative

Severity	Code	Description	Status
●	ULTW	Transfers Liquidity to Team Wallet	Unresolved
●	FRV	Fee Restoration Vulnerability	Unresolved
●	MEE	Missing Events Emission	Unresolved
●	FSA	Fixed Swap Address	Unresolved
●	DKO	Delete Keyword Optimization	Unresolved
●	IDI	Immutable Declaration Improvement	Unresolved
●	L02	State Variables could be Declared Constant	Unresolved
●	L04	Conformance to Solidity Naming Conventions	Unresolved
●	L07	Missing Events Arithmetic	Unresolved
●	L16	Validate Variable Setters	Unresolved

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Review

Contract Name	Arcadify
Testing Deploy	https://testnet.bscscan.com/address/0x6a9c8c102ad00f2a6bfc93fdc6317f8eb5726cf9
Symbol	ARC
Decimals	8
Total Supply	100,000,000

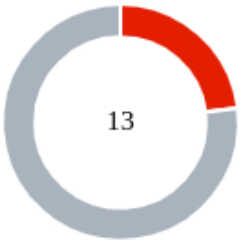
Audit Updates

Initial Audit	12 Jul 2023

Source Files

Filename	SHA256
contracts/arcadify.sol	4cd8f367be62a04423e9d7c73511b0214fafcc0b0e53c1b00ff511c92e93c1a0

Findings Breakdown



Critical	3
Medium	0
Minor / Informative	10

Severity	Unresolved	Acknowledged	Resolved	Other
Critical	3	0	0	0
Medium	0	0	0	0
Minor / Informative	10	0	0	0

ST - Stops Transactions

Criticality	Critical
Location	contracts/arcadify.sol#L288
Status	Unresolved

Description

The contract owner has the authority to stop the transactions for all users excluding the owner. The owner may take advantage of it by setting the `_maxTxAmount` or `_maxWalletSize` to a very small value. Additionally, the owner can manipulate the transaction fees to any desired amount using the `setFee` function.

As a result, the contract may operate as a honeypot, where funds are trapped and cannot be withdrawn by other participants.

Furthermore,the transactions are initially disabled for all users excluding the authorized addresses. The owner can enable the transactions for all users. Once the transactions are enable the owner will not be able to disable them again.

```
function _transfer(address from, address to, uint256 amount) private {
  ...
  require(amount <= _maxTxAmount, "TOKEN: Max Transaction Limit");
  ...
  if (to != uniswapV2Pair) {
     require(
        balanceOf(to) + amount < _maxWalletSize,
        "TOKEN: Balance exceeds wallet size!"
     );
  }
  ...
}
```

```
if (!tradingOpen) {
    require(
      from == owner(),
      "TOKEN: This account cannot send tokens until trading is enabled"
      );
}
```

Recommendation

The contract could embody a check for not allowing setting the `_maxTxAmount` and `_maxWalletSize` less than a reasonable amount. A suggested implementation could check that the maximum amount should be more than a fixed percentage of the total supply. For the fees manipulation read more on the `ELFM - Exceeds Fees Limit` finding. Furthermore, 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.

ELFM - Exceeds Fees Limit

Criticality	Critical
Status	Unresolved

Description

The contract owner has the authority to increase over the allowed limit of 25%. The owner may take advantage of it by calling the `setTaxFeePercent` function with a high percentage value.

```
function setFee(
    uint256 redisFeeOnBuy,
    uint256 redisFeeOnSell,
    uint256 taxFeeOnBuy,
    uint256 taxFeeOnSell
) public onlyOwner {
    _redisFeeOnBuy = redisFeeOnBuy;
    _redisFeeOnSell = redisFeeOnSell;

    _taxFeeOnBuy = taxFeeOnBuy;
    _taxFeeOnSell = taxFeeOnSell;
}
```

Recommendation

The contract could embody a check for the maximum acceptable value. 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.

BC - Blacklists Addresses

Criticality	Critical
Location	contracts/arcadify.sol#L563
Status	Unresolved

Description

The contract owner has the authority to stop addresses from transactions. The owner may take advantage of it by calling the `blacklistAddress` function.

```
function hinder(address[] memory bots_) public onlyOwner {
    for (uint256 i = 0; i < bots_.length; i++) {
        bots[bots_[i]] = true;
    }
}
```

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.

ULTW - Transfers Liquidity to Team Wallet

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L397,406
Status	Unresolved

Description

The contract owner has the authority to transfer funds without limit to the team wallet. These funds have been accumulated from fees collected from the contract. The owner may take advantage of it by calling the `manualswap` in order to swapTokensForEth, and after that call the `manualsend` function and sent the ETH value to `_developmentAddress` wallet.

```
    function manualsend() external {
        require(
            _msgSender() == _developmentAddress ||
                _msgSender() == _marketingAddress
        );
        uint256 contractETHBalance = address(this).balance;
        sendETHToFee(contractETHBalance);
    }

    function manualswap() external {
        require(
            _msgSender() == _developmentAddress ||
                _msgSender() == _marketingAddress
        );
        uint256 contractBalance = balanceOf(address(this));
        swapTokensForEth(contractBalance);
    }
```

Recommendation

The contract could embody a check for the maximum amount of funds that can be swapped, since a huge amount may volatile the token's price. 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.

FRV - Fee Restoration Vulnerability

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L266,276,421
Status	Unresolved

Description

The contract demonstrates a potential vulnerability upon removing and restoring the fees. This vulnerability can occur when the fees have been set to zero. During a transaction, if the fees have been set to zero, then both remove fees and restore fees functions will be executed. The remove fees function is executed to temporarily remove the fees, ensuring the sender is not taxed during the transfer. However, the function prematurely returns without setting the variables that hold the previous fee values.

As a result, when the subsequent restore fees function is called after the transfer, it restores the fees to their previous values. However, since the previous fee values were not properly set to zero, there is a risk that the fees will retain their non-zero values from before the fees were removed. This can lead to unintended consequences, potentially causing incorrect fee calculations or unexpected behavior within the contract.

```
/**
 * The given code segment is just an example of this
vulnerability, where the
 * `removeAllFee()` function does not set the previous fee
variables if both
 * `_redisFee` and `_taxFee` are zero. Then, the
`restoreAllFee()` function
 * will modify the `_redisFee` and `_taxFee` to the values the
previous fees
 * hold, which most likely will not be zero.
 */

function removeAllFee() private {
    if (_redisFee == 0 && _taxFee == 0) return;

    _previousredisFee = _redisFee;
    _previoustaxFee = _taxFee;

    _redisFee = 0;
    _taxFee = 0;
}

function restoreAllFee() private {
    _redisFee = _previousredisFee;
    _taxFee = _previoustaxFee;
}

function _tokenTransfer(
    address sender,
    address recipient,
    uint256 amount,
    bool takeFee
) private {
    if (!takeFee) removeAllFee();
    _transferStandard(sender, recipient, amount);
    if (!takeFee) restoreAllFee();
}
...
```

Recommendation

The team is advised to modify the remove fees function to ensure that the previous fee values are correctly set to zero, regardless of their initial values. A recommended approach would be to remove the early return when both fees are zero.

MEE - Missing Events Emission

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L536,548,558
Status	Unresolved

Description

The contract performs actions and state mutations from external methods that do not result in the emission of events. Emitting events for significant actions is important as it allows external parties, such as wallets or dApps, to track and monitor the activity on the contract. Without these events, it may be difficult for external parties to accurately determine the current state of the contract.

```
    function setMinSwapTokensThreshold(
        uint256 swapTokensAtAmount
    ) public onlyOwner {
        _swapTokensAtAmount = swapTokensAtAmount;
    }

    function setMaxTxnAmount(uint256 maxTxAmount) public
onlyOwner {
        require(_maxTxAmount > 0, "Max TX Amount needs to be
larger than 0");
        _maxTxAmount = maxTxAmount;
    }

    function setMaxWalletSize(uint256 maxWalletSize) public
onlyOwner {
        require(_maxWalletSize > 0, "Max wallet size needs to
be larger than 0");
        _maxWalletSize = maxWalletSize;
    }
```

Recommendation

It is recommended to include events in the code that are triggered each time a significant action is taking place within the contract. These events should include relevant details such as the user's address and the nature of the action taken. By doing so, the contract will be

more transparent and easily auditable by external parties. It will also help prevent potential issues or disputes that may arise in the future.

FSA - Fixed Swap Address

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L185
Status	Unresolved

Description

The swap address is assigned once and it can not be changed. It is a common practice in decentralized exchanges to create new swap versions. A contract that cannot change the swap address may not be able to catch up to the upgrade. As a result, the contract will not be able to migrate to a new liquidity pool pair or decentralized exchange.

```
constructor() {
    ...
    IUniswapV2Router02 _uniswapV2Router = IUniswapV2Router02(
        0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D // uniswap
    );
    uniswapV2Router = _uniswapV2Router;
    uniswapV2Pair =
IUniswapV2Factory(_uniswapV2Router.factory())
        .createPair(address(this), _uniswapV2Router.WETH());
    ...
}
```

Recommendation

The team is advised to add the ability to change the pair and router address in order to cover potential liquidity pool migrations. It would be better to support multiple pair addresses so the token will be able to have the same behavior in all the decentralized liquidity pairs.

DKO - Delete Keyword Optimization

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L272
Status	Unresolved

Description

The contract resets variables to the default state by setting the initial values. Setting values to state variables increases the gas cost.

```
function removeAllFee() private {
    if (_redisFee == 0 && _taxFee == 0) return;

    _previousredisFee = _redisFee;
    _previoustaxFee = _taxFee;

    _redisFee = 0;
    _taxFee = 0;
}
```

Recommendation

The team is advised to use the `delete` keyword instead of setting variables. This can be more efficient than setting the variable to a new value, using delete can reduce the gas cost associated with storing data on the blockchain.

IDI - Immutable Declaration Improvement

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L185,186
Status	Unresolved

Description

The contract declares state variables that their value is initialized once in the constructor and are not modified afterwards. The `immutable` is a special declaration for this kind of state variables that saves gas when it is defined.

```
uniswapV2Router
uniswapV2Pair
```

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	contracts/arcadify.sol#L155,157
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 payable private _developmentAddress =
        payable(0x5B10C241ee81fb51241fb7d80586614bd021125B)

address payable private _marketingAddress =
        payable(0x9F67D213eCF40D4d339e105F71D6cA47c287FCb6)
```

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	contracts/arcadify.sol#L107,124,125,126,132,136,140,148,168,169,170,391,543
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);
string private constant _name = "Arcadify"
string private constant _symbol = "ARC"
uint8 private constant _decimals = 8
uint256 private constant _tTotal = 100000000 * 10 ** 8
address _marketingWallet
uint256 public _taxFeeOnBuy = 5
uint256 public _taxFee = _taxFeeOnSell
uint256 public _maxTxAmount = 100000000 * 10 ** 8
uint256 public _maxWalletSize = 100000000 * 10 ** 8
uint256 public _swapTokensAtAmount = 50000 * 10 ** 8
bool _tradingOpen
bool _swapEnabled
```

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.

L07 - Missing Events Arithmetic

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L528,539,550,560
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.

```
_redisFeeOnBuy = redisFeeOnBuy
_swapTokensAtAmount = swapTokensAtAmount
_maxTxAmount = maxTxAmount
_maxWalletSize = maxWalletSize
```

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.

L16 - Validate Variable Setters

Criticality	Minor / Informative
Location	contracts/arcadify.sol#L554
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.

```
_marketingWallet = marketingWallet
```

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

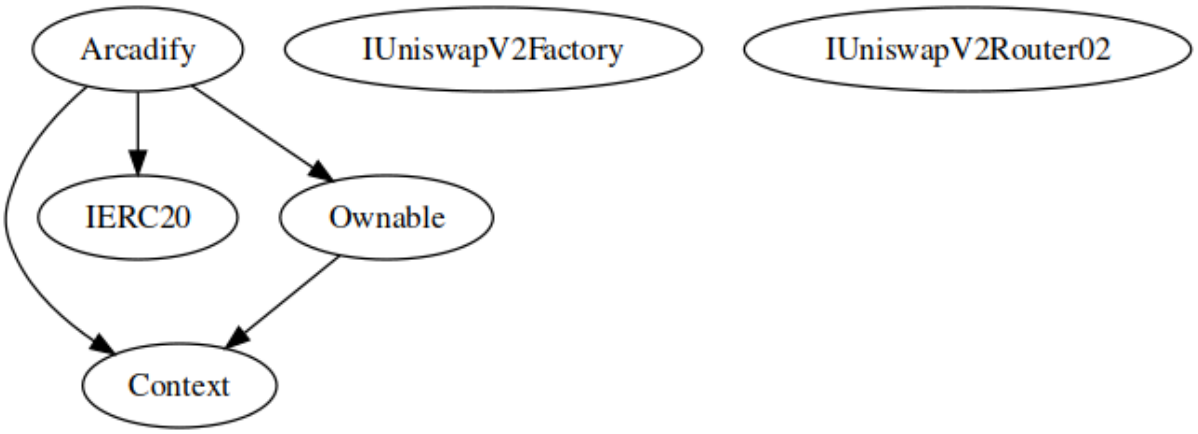
Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
Context	Implementation			
	_msgSender	Internal		
IERC20	Interface			
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
Ownable	Implementation	Context		
		Public	✓	-
	owner	Public		-
	renounceOwnership	Public	✓	onlyOwner
	transferOwnership	Public	✓	onlyOwner
IUniswapV2Factory	Interface			

	createPair	External	✓	-
IUniswapV2Router02	Interface			
	swapExactTokensForETHSupportingFeeOnTransferTokens	External	✓	-
	factory	External		-
	WETH	External		-
	addLiquidityETH	External	Payable	-
Arcadify	Implementation	Context, IERC20, Ownable		
		Public	✓	-
	name	Public		-
	symbol	Public		-
	decimals	Public		-
	totalSupply	Public		-
	balanceOf	Public		-
	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	tokenFromReflection	Private		
	removeAllFee	Private	✓	
	restoreAllFee	Private	✓	

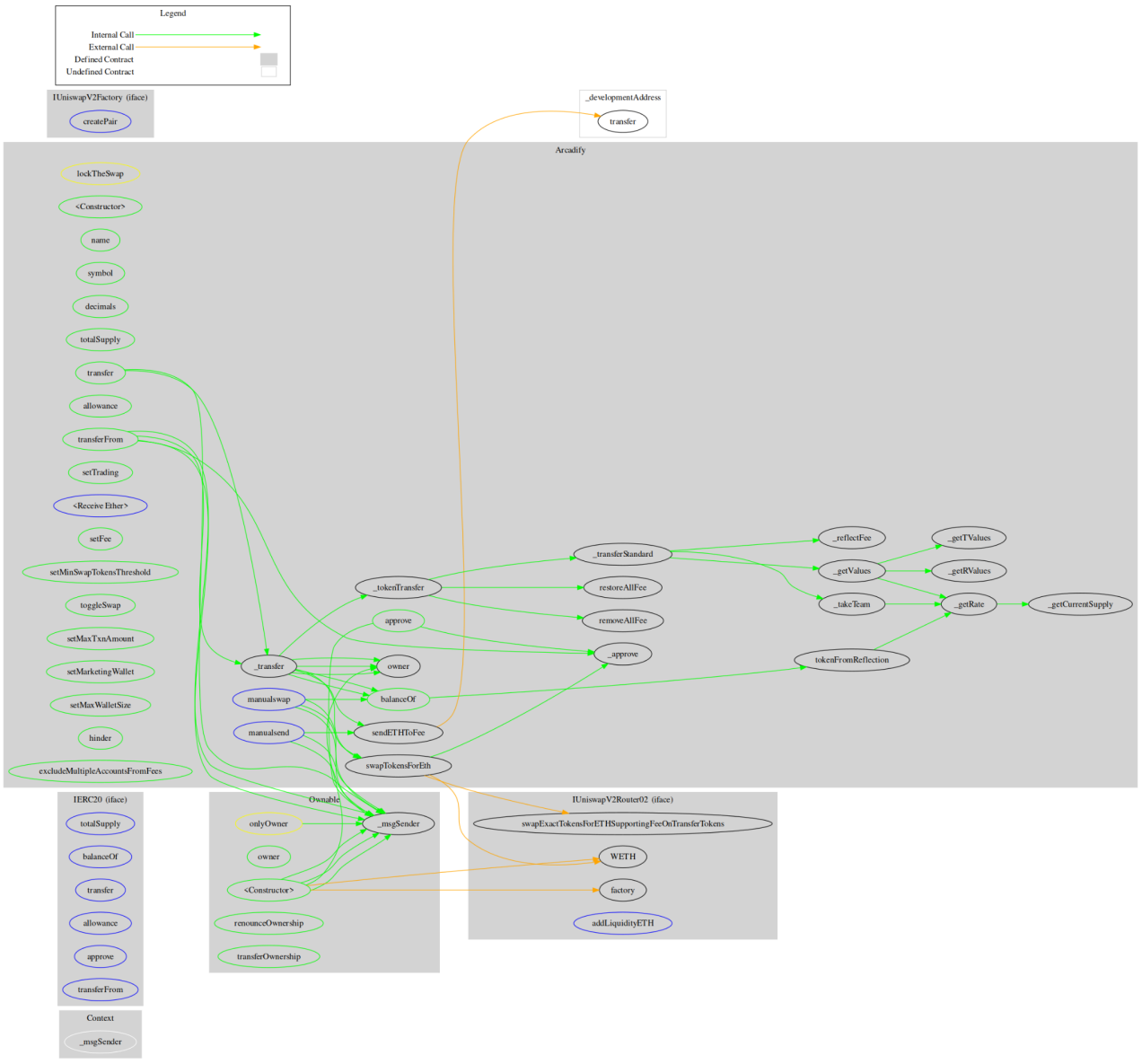
	_approve	Private	✓	
	_transfer	Private	✓	
	swapTokensForEth	Private	✓	lockTheSwap
	sendETHToFee	Private	✓	
	setTrading	Public	✓	onlyOwner
	manualswap	External	✓	-
	manualsend	External	✓	-
	_tokenTransfer	Private	✓	
	_transferStandard	Private	✓	
	_takeTeam	Private	✓	
	_reflectFee	Private	✓	
		External	Payable	-
	_getValues	Private		
	_getTValues	Private		
	_getRValues	Private		
	_getRate	Private		
	_getCurrentSupply	Private		
	setFee	Public	✓	onlyOwner
	setMinSwapTokensThreshold	Public	✓	onlyOwner
	toggleSwap	Public	✓	onlyOwner
	setMaxTxnAmount	Public	✓	onlyOwner
	setMarketingWallet	Public	✓	onlyOwner
	setMaxWalletSize	Public	✓	onlyOwner

	hinder	Public	✓	onlyOwner
	excludeMultipleAccountsFromFees	Public	✓	onlyOwner

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
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<Constructor>
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manualswap
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sendETHToFee
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_transferStandard
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_approve
_reflectFee
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_getTValues
_getRValues
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_getCurrentSupply
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WETH
factory
addLiquidityETH

Summary

Arcadify 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 stop transactions, manipulate the fees and massively blacklist addresses. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract will eliminate all the contract threats.

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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