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AUDIT COMPANY

Smart Contract Security Audit

TechRate

November, 2021

Audit Details

Audited project

BeWhale

Deployer address

0x431962c74291ef34c146650d8e326e418a585ecf

Client contacts:

BeWhale team

Blockchain

Binance Smart Chain

Project website:

https://bewhale.finance
https://bewhale.exchange
https://bewhaleswap.finance

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security. No product code has been reviewed.

Background

TechRate was commissioned by BeWhale to perform an audit of smart contracts:
https://bscscan.com/address/0xD72d34903e15D339927c72Ba04aE587eB861578D#code

The purpose of the audit was to achieve the following:

- **Ensure that the smart contract functions as intended.**
- **Identify potential security issues with the smart contract.**

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Contracts Details

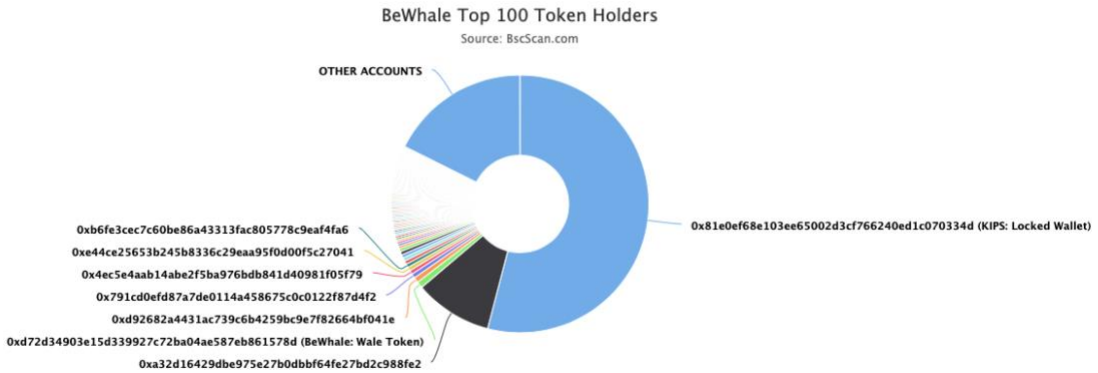
Token contract details for 16.11.2021

Contract name	BeWhale
Contract address	0xD72d34903e15D339927c72Ba04aE587eB861578D
Total supply	100,000,000
Token ticker	Wale
Decimals	9
Token holders	571
Transactions count	621
Top 100 holders dominance	82.34%
Liquidity fee	8
Tax fee	2
Total fees	202000000000000
Uniswap V2 pair	0x25b101e17ca4ed4fdea9c1f08a26e31b2f31b015
Contract deployer address	0x431962c74291ef34c146650d8e326e418a585ecf
Contract's current owner address	0xa32d16429dbe975e27b0dbbf64fe27bd2c988fe2

BeWhale Token Distribution

The top 100 holders collectively own 82.34% (82,339,041.24 Tokens) of BeWhale

Token Total Supply: 100,000,000.00 Token | Total Token Holders: 571

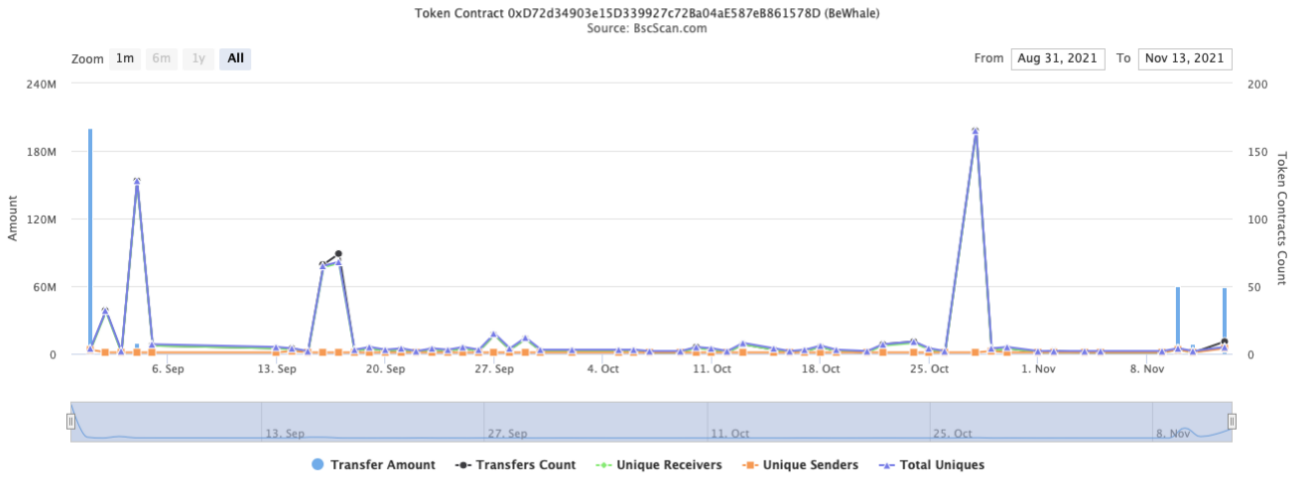


(A total of 82,339,041.24 tokens held by the top 100 accounts from the total supply of 100,000,000.00 token)

BeWhale Contract Interaction Details

Time Series: Token Contract Overview

Wed 1, Sept 2021 - Sat 13, Nov 2021



BeWhale Top 10 Token Holders

Rank	Address	Quantity (Token)	Percentage
1	KIPS: Locked Wallet	54,060,120.240480962	54.0601%
2	0xa32d16429dbe975e27b0dbbf64fe27bd2c988fe2	9,758,212.615191181	9.7582%
3	BeWhale: Wale Token	809,619.398800801	0.8096%
4	0xd92682a4431ac739c6b4259bc9e7f82664bf041e	666,766	0.6668%
5	0x791cd0efd87a7de0114a458675c0c0122f87d4f2	568,136.27254509	0.5681%
6	0x4ec5e4aab14abe2f5ba976bdb841d40981f05f79	473,446.893787575	0.4734%
7	0xe44ce25653b245b8336c29eaa95f0d00f5c27041	472,500	0.4725%
8	0xb6fe3cec7c60be86a43313fac805778c9eaf4fa6	440,000	0.4400%
9	0x3666a9cc45f6c7ec7b746e42f4df45313cbb436f	437,360	0.4374%
10	0x139b7824d3579abc9810c293f88c243b6bd8ae45	435,000	0.4350%

Contract functions details

+ [Int] IERC20
  - [Ext] totalSupply
  - [Ext] balanceOf
  - [Ext] transfer #
  - [Ext] allowance
  - [Ext] approve #
  - [Ext] transferFrom #

+ [Lib] SafeMath
  - [Int] add
  - [Int] sub
  - [Int] sub
  - [Int] mul
  - [Int] div
  - [Int] div
  - [Int] mod
  - [Int] mod

+ Context
  - [Int] _msgSender
  - [Int] _msgData

+ [Lib] Address
  - [Int] isContract
  - [Int] sendValue #
  - [Int] functionCall #
  - [Int] functionCall #
  - [Int] functionCallWithValue #
  - [Int] functionCallWithValue #
  - [Prv] _functionCallWithValue #

+ Ownable (Context)
  - [Int] <Constructor> #
  - [Pub] owner
  - [Pub] lockedLiquidity
  - [Pub] marketing
  - [Pub] burn
  - [Pub] renounceOwnership #
    - modifiers: onlyOwner
  - [Pub] transferOwnership #
    - modifiers: onlyOwner
  - [Pub] setMarketingAddress #
    - modifiers: onlyOwner
  - [Pub] setLockedLiquidityAddress #
    - modifiers: onlyOwner

+ [Int] IUniswapV2Factory
  - [Ext] feeTo
  - [Ext] feeToSetter
  - [Ext] getPair
  - [Ext] allPairs

- [Ext] allPairsLength
- [Ext] createPair #
- [Ext] setFeeTo #
- [Ext] setFeeToSetter #

+ [Int] IUniswapV2Pair
- [Ext] name
- [Ext] symbol
- [Ext] decimals
- [Ext] totalSupply
- [Ext] balanceOf
- [Ext] allowance
- [Ext] approve #
- [Ext] transfer #
- [Ext] transferFrom #
- [Ext] DOMAIN_SEPARATOR
- [Ext] PERMIT_TYPEHASH
- [Ext] nonces
- [Ext] permit #
- [Ext] MINIMUM_LIQUIDITY
- [Ext] factory
- [Ext] token0
- [Ext] token1
- [Ext] getReserves
- [Ext] price0CumulativeLast
- [Ext] price1CumulativeLast
- [Ext] kLast
- [Ext] mint #
- [Ext] burn #
- [Ext] swap #
- [Ext] skim #
- [Ext] sync #
- [Ext] initialize #

+ [Int] IUniswapV2Router01
- [Ext] factory
- [Ext] WETH
- [Ext] addLiquidity #
- [Ext] addLiquidityETH ($)
- [Ext] removeLiquidity #
- [Ext] removeLiquidityETH #
- [Ext] removeLiquidityWithPermit #
- [Ext] removeLiquidityETHWithPermit #
- [Ext] swapExactTokensForTokens #
- [Ext] swapTokensForExactTokens #
- [Ext] swapExactETHForTokens ($)
- [Ext] swapTokensForExactETH #
- [Ext] swapExactTokensForETH #
- [Ext] swapETHForExactTokens ($)
- [Ext] quote
- [Ext] getAmountOut
- [Ext] getAmountIn
- [Ext] getAmountsOut
- [Ext] getAmountsIn

+ [Int] IUniswapV2Router02 (IUniswapV2Router01)
  - [Ext] removeLiquidityETHSupportingFeeOnTransferTokens #
  - [Ext] removeLiquidityETHWithPermitSupportingFeeOnTransferTokens #
  - [Ext] swapExactTokensForTokensSupportingFeeOnTransferTokens #
  - [Ext] swapExactETHForTokensSupportingFeeOnTransferTokens ($)
  - [Ext] swapExactTokensForETHSupportingFeeOnTransferTokens #

+ BeWhale (Context, IERC20, Ownable)
  - [Pub] <Constructor> #
  - [Pub] name
  - [Pub] symbol
  - [Pub] decimals
  - [Pub] totalSupply
  - [Pub] balanceOf
  - [Pub] transfer #
  - [Pub] allowance
  - [Pub] approve #
  - [Pub] transferFrom #
  - [Pub] increaseAllowance #
  - [Pub] decreaseAllowance #
  - [Pub] isExcludedFromReward
  - [Pub] totalFees
  - [Pub] marketingPercentageOfLiquidity
  - [Pub] totalMarketingCollected
  - [Pub] deliver #
  - [Pub] reflectionFromToken
  - [Pub] tokenFromReflection
  - [Pub] excludeFromReward #
    - modifiers: onlyOwner
  - [Ext] includeInReward #
    - modifiers: onlyOwner
  - [Pub] devWallet
  - [Ext] setAsDevWallet #
    - modifiers: onlyOwner
  - [Prv] _transferBothExcluded #
  - [Pub] excludeFromFee #
    - modifiers: onlyOwner
  - [Pub] includeInFee #
    - modifiers: onlyOwner
  - [Ext] setTaxFeePercent #
    - modifiers: onlyOwner
  - [Ext] setLiquidityFeePercent #
    - modifiers: onlyOwner
  - [Pub] setSwapAndLiquifyEnabled #
    - modifiers: onlyOwner
  - [Ext] <Fallback> ($)
  - [Prv] _reflectFee #
  - [Prv] _getValues
  - [Prv] _getTValues
  - [Prv] _getRValues
  - [Prv] _getRate
  - [Prv] _getCurrentSupply
  - [Prv] _takeLiquidity #
  - [Prv] calculateTaxFee
  - [Prv] calculateLiquidityFee

- [Prv] removeAllFee #
- [Prv] restoreAllFee #
- [Prv] setDevWalletFee #
- [Pub] isExcludedFromFee
- [Prv] _approve #
- [Prv] _transfer #
- [Pub] collectMarketing #
  - modifiers: onlyMarketing
- [Prv] swapAndLiquify #
  - modifiers: lockTheSwap
- [Prv] swapTokensForEth #
- [Prv] addLiquidity #
- [Prv] _tokenTransfer #
- [Prv] _transferStandard #
- [Prv] _transferToExcluded #
- [Prv] _transferFromExcluded #

($) = payable function
= non-constant function

Issues Checking Status

	Issue description	Checking status
1.	Compiler errors.	Passed
2.	Race conditions and Reentrancy. Cross-function race conditions.	Passed
3.	Possible delays in data delivery.	Passed
4.	Oracle calls.	Passed
5.	Front running.	Passed
6.	Timestamp dependence.	Passed
7.	Integer Overflow and Underflow.	Passed
8.	DoS with Revert.	Passed
9.	DoS with block gas limit.	Low issues
10.	Methods execution permissions.	Passed
11.	Economy model of the contract.	Passed
12.	The impact of the exchange rate on the logic.	Passed
13.	Private user data leaks.	Passed
14.	Malicious Event log.	Passed
15.	Scoping and Declarations.	Passed
16.	Uninitialized storage pointers.	Passed
17.	Arithmetic accuracy.	Passed
18.	Design Logic.	Passed
19.	Cross-function race conditions.	Passed
20.	Safe Open Zeppelin contracts implementation and usage.	Passed
21.	Fallback function security.	Passed

Security Issues

High Severity Issues

No high severity issues found.

Medium Severity Issues

No medium severity issues found.

Low Severity Issues

1. Out of gas

Issue:

- The function `includeInReward()` uses the loop to find and remove addresses from the `_excluded` list. Function will be aborted with `OUT_OF_GAS` exception if there will be a long excluded addresses list.

```
function includeInReward(address account⬆) external onlyOwner() {
    require(_isExcluded[account⬆], "Account is already excluded");
    for (uint256 i = 0; i < _excluded.length; i++) {
        if (_excluded[i] == account⬆) {
            _excluded[i] = _excluded[_excluded.length - 1];
            _tOwned[account⬆] = 0;
            _isExcluded[account⬆] = false;
            _excluded.pop();
            break;
        }
    }
}
```

- The function `_getCurrentSupply` also uses the loop for evaluating total supply. It also could be aborted with `OUT_OF_GAS` exception if there will be a long excluded addresses list.

```
function _getCurrentSupply() private view returns (uint256, uint256) {
    uint256 rSupply = _rTotal;
    uint256 tSupply = _tTotal;
    for (uint256 i = 0; i < _excluded.length; i++) {
        if (
            _rOwned[_excluded[i]] > rSupply ||
            _tOwned[_excluded[i]] > tSupply
        ) return (_rTotal, _tTotal);
        rSupply = rSupply.sub(_rOwned[_excluded[i]]);
        tSupply = tSupply.sub(_tOwned[_excluded[i]]);
    }
    if (rSupply < _rTotal.div(_tTotal)) return (_rTotal, _tTotal);
    return (rSupply, tSupply);
}
```

Recommendation:

Check that the excluded array length is not too big.

Owner privileges (In the period when the owner is not renounced)

- Owner can change the tax and liquidity fee.

```
function setTaxFeePercent(uint256 taxFee) external onlyOwner() {
    _taxFee = taxFee;
}

function setLiquidityFeePercent(uint256 liquidityFee) external onlyOwner() {
    _liquidityFee = liquidityFee;
}
```

- Owner can change the maximum transaction amount.

```
  function setMaxTxPercent(uint256 maxTxPercent) external onlyOwner() {
      _maxTxAmount = _tTotal.mul(maxTxPercent).div(
          10**2
      );
  }
```

- Owner can exclude from the fee.

```
  function excludeFromFee(address account) public onlyOwner {
      _isExcludedFromFee[account] = true;
  }
```

- Owner can withdraw BNBs to marketing address.

```
function collectMarketing() public onlyMarketing
{
    _totalMarketingCollected = _totalMarketingCollected.add(address(this).balance);
    emit MarketingCollected(address(this).balance);
    marketing().transfer(address(this).balance);
}
```

- Owner can set addresses as devs.

```
function setAsDevWallet(address account) external onlyOwner() {
    _isDevWallet[account] = true;
}
```

- Owner can change marketing and locked liquidity address.

```
function setMarketingAddress(address payable marketingAddress) public virtual onlyOwner
{
    require(_marketing == address(0), "Marketing address cannot be changed once set");
    _marketing = marketingAddress;
}

ftrace | funcSig
function setLockedLiquidityAddress(address liquidityAddress) public virtual onlyOwner
{
    require(_lockedLiquidity == address(0), "Locked liquidity address cannot be changed once set");
    _lockedLiquidity = liquidityAddress;
}
```

Conclusion

Smart contracts contain low severity issues! Liquidity pair contract's security is not checked due to out of scope.

Liquidity locking details NOT provided by the team.

TechRate note:

Please check the disclaimer above and note, the audit makes no statements or warranties on business model, investment attractiveness or code sustainability. The report is provided for the only contract mentioned in the report and does not include any other potential contracts deployed by Owner.