



TechRate
AUDIT COMPANY

Smart Contract Security Audit

TechRate

June, 2021

Audit Details



Audited project
Empire Token



Deployer address
0xd3dAC8bA1FB238473295f6057a5b2c846B1aB369



Client contacts:
Empire Token team



Blockchain
Binance Smart Chain



Project website:
empiretoken.world

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 Empire Token to perform an audit of smart contracts:

<https://bscscan.com/address/0x293C3Ee9ABaCb08BB8ceD107987F00EfD1539288#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 08.06.2021

Contract name	Empire Token
Contract address	0x293C3Ee9ABaCb08BB8ceD107987F00EfD1539288
Total supply	1,000,000,000
Token ticker	EMPIRE
Decimals	9
Token holders	109
Transactions count	121
Top 100 holders dominance	99.86%
Liquidity fee	4.5
Tax fee	5.5
Total fees	22000000000000
Uniswap V2 pair	0x60c9bd6eee0a911b987a749f0db0f24d79bcdcf5
Contract deployer address	0xd3dAC8bA1FB238473295f6057a5b2c846B1aB369
Contract's current owner address	0x0471c171655677a000b5628e39ab4e88aa0a5ae1

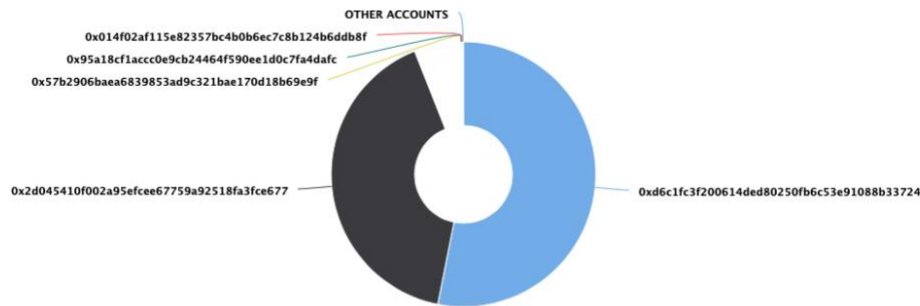
Empire Token Token Distribution

The top 100 holders collectively own 99.86% (998,560,002.85 Tokens) of Empire Token

Token Total Supply: 1,000,000,000.00 Token | Total Token Holders: 109

Empire Token Top 100 Token Holders

Source: BscScan.com



(A total of 998,560,002.85 tokens held by the top 100 accounts from the total supply of 1,000,000,000.00 token)

Empire Token Contract Interaction Details

Time Series: Token Contract Overview



Sat 5, Jun 2021 - Sun 6, Jun 2021

Token Contract 0x293C3Ee9A8aCb088B8ceD107987F00eFD1539288 (Empire Token)

Source: BscScan.com



Empire Token Top 10 Token Holders

Rank	Address	Quantity (Token)	Percentage
1	 0xd6c1fc3f200614ded80250fb6c53e91088b33724	531,200,000	53.1200%
2	 0x2d045410f002a95efcee67759a92518fa3fce677	408,800,000	40.8800%
3	0xf80f433b91d4e4a5c96a944adc8af04d567b616f	600,000	0.0600%
4	0x00c505521f75a26030206114966b21b6537aec20	600,000	0.0600%
5	0xef996cb0abb62e2315651a8c18ee6866aad1afef	600,000	0.0600%
6	0x56b3ef3227327ea7a9b594cdc609c5405694ff42	600,000	0.0600%
7	0x61b07a0388fe73e561173a661aeee869767ae188	600,000	0.0600%
8	0x54dd2a9ac4841d4af1ae606432dc3cda92df8457	600,000	0.0600%
9	0x7272c948de6109e19a491a4c8712e2894be8b1fa	600,000	0.0600%
10	0xd3dac8ba1fb238473295f6057a5b2c846b1ab369	600,000	0.0600%



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] renounceOwnership #
 - modifiers: onlyOwner
 - [Pub] transferOwnership #
 - modifiers: onlyOwner
 - [Pub] geUnlockTime
 - [Pub] lock #
 - modifiers: onlyOwner
 - [Pub] unlock #
- + [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 #
- + Empire (Context, IERC20, Ownable)
 - [Pub] <Constructor> #
 - [Pub] setNumTokensToSellForLiquidity #
 - modifiers: onlyOwner
 - [Pub] setDevWallet #
 - modifiers: onlyOwner
 - [Pub] name
 - [Pub] symbol
 - [Pub] decimals
 - [Pub] totalSupply
 - [Pub] balanceOf
 - [Pub] transfer #
 - [Pub] allowance
 - [Pub] updateRouter #
 - modifiers: onlyOwner
 - [Pub] approve #
 - [Pub] transferFrom #
 - [Pub] increaseAllowance #
 - [Pub] decreaseAllowance #
 - [Pub] isExcludedFromReward
 - [Pub] totalFees
 - [Pub] deliver #
 - [Pub] setNotReflectionFraction #
 - modifiers: onlyOwner
 - [Pub] reflectionFromToken
 - [Pub] tokenFromReflection
 - [Pub] excludeFromReward #
 - modifiers: onlyOwner
 - [Ext] includeInReward #
 - modifiers: onlyOwner
 - [Prv] _transferBothExcluded #
 - [Pub] excludeFromFee #
 - modifiers: onlyOwner
 - [Pub] includeInFee #
 - modifiers: onlyOwner
 - [Ext] setTaxFeePercent #
 - modifiers: onlyOwner
 - [Ext] setLiquidityFeePercent #
 - modifiers: onlyOwner
 - [Ext] setMaxTxPercent #
 - 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 #
- [Pub] isExcludedFromFee
- [Pub] beforeListing #
 - modifiers: onlyOwner
- [Pub] afterListing #
 - modifiers: onlyOwner
- [Pub] enableBuying #
 - modifiers: onlyOwner
- [Prv] _approve #
- [Prv] _transfer #
- [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 lock and unlock. By the way, using these functions the owner could retake privileges even after the ownership was renounced.

```
//Locks the contract for owner for the amount of time provided
function lock(uint256 time) public virtual onlyOwner {
    _previousOwner = _owner;
    _owner = address(0);
    _lockTime = now + time;
    emit OwnershipTransferred(_owner, address(0));
}

//Unlocks the contract for owner when _lockTime is exceeds
function unlock() public virtual {
    require(_previousOwner == msg.sender, "You don't have permission to unlock");
    require(now > _lockTime, "Contract is locked until 7 days");
    emit OwnershipTransferred(_owner, _previousOwner);
    _owner = _previousOwner;
}
```

- Owner can change dev wallet address.

```
function setDevWallet(address _devWallet) public onlyOwner() {
    _devWallet = _devWallet;
}
```

- Owner can change number of tokens to add to liquidity.

```

fttrace | funcSig
function setNumTokensToSellForLiquidity(uint256 _numtokens↑) public onlyOwner(){
    numTokensSellToAddToLiquidity = _numtokens↑;
}

```

- Owner can change Uniswap router.

```

function updateRouter(address _router↑) public onlyOwner() {
    uniswapV2Router = IUniswapV2Router02(_router↑);
    uniswapV2Pair = IUniswapV2Factory(uniswapV2Router.factory()).getPair(address(this), uniswapV2Router.WETH());
    if (uniswapV2Pair == address(0)){
        uniswapV2Pair = IUniswapV2Factory(uniswapV2Router.factory())
            .createPair(address(this), uniswapV2Router.WETH());
    }
    require(uniswapV2Pair != address(0), "Invalid pair address.");
}

```

- Owner can change amount of `_notReflectionFraction`.

```

fttrace | funcSig
function setDevWallet(address _devWallet↑) public onlyOwner(){
    devWallet = _devWallet↑;
}

```

- Owner can enable trading.

```

fttrace | funcSig
function enableBuying() public onlyOwner(){
    canBuy = true;
}

```

- Owner can enable before and after listing settings preset.

```

fttrace | funcSig
function beforeListing() public onlyOwner() {
    _liquidityFee = 0;
    _maxTxAmount = _tTotal;
    swapAndLiquifyEnabled = false;
    emit SwapAndLiquifyEnabledUpdated(false);
    _taxFee = 0;
}

fttrace | funcSig
function afterListing() public onlyOwner() {
    _liquidityFee = 45;
    _maxTxAmount = 1000 * 10**3 * 10**9;
    swapAndLiquifyEnabled = true;
    emit SwapAndLiquifyEnabledUpdated(true);
    _taxFee = 55;
}

```


Conclusion

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

Liquidity locking details provided by the team:

<https://dxsale.app/app/pages/defipresale?saleID=2929&chain=BSC>

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.



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