

SMART CONTRACT AUDIT

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PREPARED FOR

NODE AI



INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	Node Al
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Contract	0x2B2cbe6342eD4b7AAE36565E17193D85F8bf439d
Blockchain	Ethereum Chain
Centralization	Active ownership
Commit AUDIT REPORT CONFI	16fc51c9ba49d53cd06e9298c5bdfb0fa7a65391
Website	https://nodeai.app/
Telegram	https://t.me/nodeaieth/
X (Twitter)	https://twitter.com/NodeAIETH/
Report Date	October 24, 2023

I Verify the authenticity of this report on our website: https://www.github.com/interfinetwork



EXECUTIVE SUMMARY

InterFi has performed the automated and manual analysis of solidity codes. Solidity codes were reviewed for common contract vulnerabilities and centralized exploits. Here's a quick audit summary:

Status	Critical	Major 🛑	Medium 🔵	Minor	Unknown
Open	0	0	0	1	1
Acknowledged	0	0	1	2	1
Resolved	0	0	0	2	0
Important Privileges Enable Trading, Multi Send Tokens, Set Swap Settings, Set LP Pair, Set Router					

Please note that smart contracts deployed on blockchains aren't resistant to exploits, vulnerabilities and/or hacks. Blockchain and cryptography assets utilize new and emerging technologies. These technologies present a high level of ongoing risks. For a detailed understanding of risk severity, source code vulnerability, and audit limitations, kindly review the audit report thoroughly.

Please note that centralization privileges regardless of their inherited risk status - constitute an elevated impact on smart contract safety and security.



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SCOPE OF WORK

InterFi was consulted by Node AI to conduct the smart contract audit of their solidity source codes.

The audit scope of work is strictly limited to mentioned solidity file(s) only:

- NodeAl.sol
- If source codes are not deployed on the main net, they can be modified or altered before mainnet deployment. Verify the contract's deployment status below:

Public Contract Link					
https://etherscan.io/address	s/0x2B2cbe63	42eD4b7AAE36	565E17193D85F	8bf439d#code	<u> </u>
Contract Name	NodeAl				
Compiler Version	0.8.19				
License	MIT				



AUDIT METHODOLOGY

Smart contract audits are conducted using a set of standards and procedures. Mutual collaboration is essential to performing an effective smart contract audit. Here's a brief overview of InterFi's auditing process and methodology:

CONNECT

The onboarding team gathers source codes, and specifications to make sure we understand the size, and scope of the smart contract audit.

AUDIT

- Automated analysis is performed to identify common contract vulnerabilities. We may use the following third-party frameworks and dependencies to perform the automated analysis:
 - Remix IDE Developer Tool
 - Open Zeppelin Code Analyzer
 - SWC Vulnerabilities Registry
 - DEX Dependencies, e.g., Pancakeswap, Uniswap
- Simulations are performed to identify centralized exploits causing contract and/or trade locks.
- A manual line-by-line analysis is performed to identify contract issues and centralized privileges.
 We may inspect below mentioned common contract vulnerabilities, and centralized exploits:

	 Token Supply Manipulation
	o Access Control and Authorization
	o Assets Manipulation
Centralized Exploits	o Ownership Control
Centralized Exploits	o Liquidity Access
	 Stop and Pause Trading
	 Ownable Library Verification



	o Integer Overflow
	 Lack of Arbitrary limits
	o Incorrect Inheritance Order
	 Typographical Errors
	o Requirement Violation
	o Gas Optimization
	o Coding Style Violations
Common Contract Vulnerabilities	o Re-entrancy
	 Third-Party Dependencies
	o Potential Sandwich Attacks
	o Irrelevant Codes
	o Divide before multiply
	o Conformance to Solidity Naming Guides
	o Compiler Specific Warnings

REPORT

The auditing team provides a preliminary report specifying all the checks which have been performed and the findings thereof.

o Language Specific Warnings

- o The client's development team reviews the report and makes amendments to solidity codes.
- o The auditing team provides the final comprehensive report with open and unresolved issues.

PUBLISH

- o The client may use the audit report internally or disclose it publicly.
- It is important to note that there is no pass or fail in the audit, it is recommended to view the audit as an unbiased assessment of the safety of solidity codes.



RISK CATEGORIES

Smart contracts are generally designed to hold, approve, and transfer tokens. This makes them very tempting attack targets. A successful external attack may allow the external attacker to directly exploit. A successful centralization-related exploit may allow the privileged role to directly exploit. All risks which are identified in the audit report are categorized here for the reader to review:

Risk Type	Definition
Critical •	These risks could be exploited easily and can lead to asset loss, data loss, asset, or data manipulation. They should be fixed right away.
Major	These risks are hard to exploit but very important to fix, they carry an elevated risk of smart contract manipulation, which can lead to high-risk severity.
Medium INTERE AUDIT REPORT Minor	These risks should be fixed, as they carry an inherent risk of future exploits, and hacks which may or may not impact the smart contract execution. Low-risk reentrancy-related vulnerabilities should be fixed to deter exploits. These risks do not pose a considerable risk to the contract or those who interact with it. They are code-style violations and deviations from standard practices. They should be highlighted and fixed nonetheless.
Unknown	These risks pose uncertain severity to the contract or those who interact with it. They should be fixed immediately to mitigate the risk uncertainty.

All statuses which are identified in the audit report are categorized here for the reader to review:

Status Type	Definition
Open	Risks are open.
Acknowledged	Risks are acknowledged, but not fixed.
Resolved	Risks are acknowledged and fixed.



CENTRALIZED PRIVILEGES

Centralization risk is the most common cause of cryptography asset loss. When a smart contract has a privileged role, the risk related to centralization is elevated.

There are some well-intended reasons have privileged roles, such as:

- o Privileged roles can be granted the power to pause() the contract in case of an external attack.
- o Privileged roles can use functions like, include(), and exclude() to add or remove wallets from fees, swap checks, and transaction limits. This is useful to run a presale and to list on an exchange.

Authorizing privileged roles to externally-owned-account (EOA) is dangerous. Lately, centralization-related losses are increasing in frequency and magnitude.

- o The client can lower centralization-related risks by implementing below mentioned practices:
- o Privileged role's private key must be carefully secured to avoid any potential hack.
- Privileged role should be shared by multi-signature (multi-sig) wallets.
- Authorized privilege can be locked in a contract, user voting, or community DAO can be introduced to unlock the privilege.
- Renouncing the contract ownership, and privileged roles.
- o Remove functions with elevated centralization risk.
- Understand the project's initial asset distribution. Assets in the liquidity pair should be locked. Assets outside the liquidity pair should be locked with a release schedule.



AUTOMATED ANALYSIS

Symbol	Definition
	Function modifies state
	Function is payable
	Function is internal
	Function is private
Ţ	Function is important

```
| **IERC20** | Interface | |||
| L | totalSupply | External ! | NO! |
| L | decimals | External ! | NO! |
| L | symbol | External ! | NO! |
| L | name | External ! | NO! |
getOwner PExternal !AUDIT NO!RT CONFIDEN
| L | balanceOf | External ! | NO! | |
| L | transfer | External ! | 🔎 |NO! |
| L | allowance | External ! | NO! |
| L | approve | External ! | 🔎 |NO! |
| L | transferFrom | External ! | 🔴 |NO! |
| **IFactoryV2** | Interface | |||
| L | getPair | External ! | NO! |
| └ | createPair | External ! | ● |NO! |
| **IV2Pair** | Interface | |||
| L | factory | External ! | NO! |
| L | getReserves | External ! | NO! |
| L | sync | External ! | 🛑 |NO! |
| **IRouter01** | Interface | |||
```



```
| L | factory | External ! | NO! | |
| L | WETH | External ! | NO! |
| L | addLiquidityETH | External ! | 🐸 |NO! |
| L | addLiquidity | External ! | 🛑 |NO! |
| L | swapExactETHForTokens | External ! | 🟴 |NO! |
| L | getAmountsOut | External ! |
| L | getAmountsIn | External ! | NO! |
\Pi\Pi\Pi\Pi
| **IRouter02** | Interface | IRouter01 |||
| └ | swapExactTokensForETHSupportingFeeOnTransferTokens | External ! | ● |NO! |
📗 📙 | swapExactETHForTokensSupportingFeeOnTransferTokens | External 🚦 | 💹 |NO 🛂 |
| L | swapExactTokensForTokensSupportingFeeOnTransferTokens | External ! | 🛑 | NO! |
| └ | swapExactTokensForTokens | External ! | ● |NO! |
\Pi\Pi\Pi\Pi
| **Initializer** | Interface | |||
| L | setLaunch | External ! | 🔴 |NO! |
| L | getConfig | External ! | ● |NO! |
| └ | getInits | External ! | ● |NO! |
| L | setLpPair | External ! | 📦 |NO! |
| **NodeAI** | Implementation | IERC20 |||
| L | <Constructor> | Public ! | 💆 |NO! |
| L | transferOwner | External ! | 🔎 | onlyOwner |
| L | renounceOwnership | External ! | • | onlyOwner |
| L | setOperator | Public ! | 🔴 |NO! |
| L | renounceOriginalDeployer | External ! | • | NO! |
| L | <Receive Ether> | External ! | MO! |
| L | totalSupply | External ! | NO! |
| L | decimals | External ! | NO! |
| L | symbol | External ! | NO! |
| L | name | External ! | | NO! |
| L | getOwner | External ! | NO! |
```

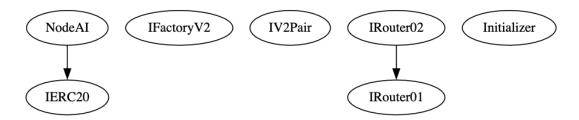


```
| L | allowance | External ! | NO! | |
| L | balanceOf | Public ! | NO! |
| L | transfer | Public ! | 🛑 |NO! |
| L | approve | External ! | 📦 |NO! |
| └ | _approve | Internal 🍙 | 🔴 | |
| L | approveContractContingency | External ! | 🔎 | onlyOwner |
| L | transferFrom | External ! | P | NO! |
| L | setNewRouter | External ! | 

| onlyOwner |
| L | setLpPair | External ! | 🔴 | onlyOwner |
| └ | setInitializer | Public ! | ● | onlyOwner |
| L | isExcludedFromFees | External ! | NO! |
| L | setExcludedFromFees | Public ! | 🔴 | onlyOwner |
| L | isExcludedFromProtection | External ! | NO! |
| | setExcludedFromProtection | External ! | • | onlyOwner |
| L | getCirculatingSupply | Public ! |
| L | setWallets | External ! | 🔴 | onlyOwner |
| L | getTokenAmountAtPriceImpact | External ! | NO! |
| L | setSwapSettings | External ! | Page | onlyOwner |
| L | setPriceImpactSwapAmount | External ! | OnlyOwner |
| L | _hasLimits | Internal 🗎 | | |
| └ | _transfer | Internal 🔒 | ● | |
| └ | contractSwap | Internal 🍙 | 🔎 | inSwapFlag |
| └ | _checkLiquidityAdd | Internal 🏻 | ● | |
| L | enableTrading | Public ! | ● | onlyOwner |
| L | sweepContingency | External ! | • | onlyOwner |
| └ | sweepExternalTokens | External ! | ● | onlyOwner |
| L | multiSendTokens | External ! | Gentlement | onlyOwner |
| └ | finalizeTransfer | Internal 🗎 | 🔴 | |
| └ | takeTaxes | Internal 🔒 | 🛑 | |
```



INHERITANCE GRAPH



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MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralized privileges	
CHM-01	Trading must be enabled to allow EOAs to transfer/trade assets	Medium 🔵
CEN-07	Authorizations and access controls	

Important only0wner centralized privileges are listed below:

```
transferOwner()
renounceOwnership()
approveContractContingency()
setNewRouter()
setLpPair()
setInitializer()
setExcludedFromFees()
setExcludedFromProtection()
setWallets()
setSwapSettings()
setPriceImpactSwapAmount()
setContractSwapEnabled()
excludePresaleAddresses()
enableTrading()
sweepContingency()
sweepExternalTokens()
multiSendTokens()
```

originalDeployer has access control of functions listed below:

setOperator()
renounceOriginalDeployer()





RECOMMENDATION

Deployers, contract owners, operators', access controlled, and all other privileged roles' private-keys/access-keys/admin-keys should be secured carefully. These entities can have a single point of failure that compromises the security of the project.

<u>Implement multi-signature wallets:</u> Require multiple signatures from different parties to execute certain sensitive functions within contracts. This spreads control and reduces the risk of a single party having complete authority.

<u>Use a decentralized governance model:</u> Implement a governance model that enables token holders or other stakeholders to participate in decision-making processes. This can include voting on contract upgrades, parameter changes, or any other critical decisions that impact the contract's functioning.

ACKNOWLEDGEMENT

For SAFU contracts, smart contract ownership is held by an external developer for at least 7 days from public launch. Centralization risk remains elevated after the ownership transfer to the project team.



Identifier	Definition	Severity
CEN-02	Initial asset distribution	Minor

All of the initially minted assets are sent to the project owner when deploying the contract. This can be an issue as the project owner can distribute tokens without consulting the community.

```
uint256 constant private startingSupply = 100_000_000;
uint256 constant private _tTotal = startingSupply * 10**_decimals;
   _tOwned[_owner] = _tTotal;
   emit Transfer(address(0), _owner, _tTotal);
```

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RECOMMENDATION

The community should be consulted during the initial asset distribution process.

RESOLUTION

Asset transfer is done by an external SAFU developer. All assets out of liquidity are locked for at least 30 days from public launch.



Identifier	Definition	Severity
LOG-02	Potential front-running	Minor

Potential front-running also classified as – sandwich attack happens when an attacker observes a transaction swapping tokens or adding liquidity without setting restrictions on slippage or minimum output amount. The attacker can manipulate the exchange rate by front-running a transaction to purchase assets and make profits by back-running a transaction to sell assets.

swapExactTokensForETHSupportingFeeOnTransferTokens()

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RECOMMENDATION

Function responsible for swap should be provided reasonable minimum output amounts, instead of zero.

ACKNOWLEDGEMENT

Front-running is not avoidable on public blockchains. Node AI team commented that, features like transaction tax, and anti-snipe should deter front-runners, and mitigate the front-running viability.



Identifier	Definition	Severity
COD-01	Authorization through tx.origin	Unknown

In _hasLimits, there's a check for tx.origin != _owner. Relying on tx.origin can be potentially dangerous as it ignores any intermediate contract calls, and refers to the original external account that started the transaction.

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RECOMMENDATION

Avoid authorizations via global variables wherever necessary.



Identifier	Definition	Severity
COD-02	Timestamp manipulation via block.timestamp Avoid using block.number as timestamp	Minor •

Be aware that the timestamp of the block can be manipulated by a miner. When the contract uses the timestamp to seed a random number, the miner can actually post a timestamp within 15 seconds of the block being validated, effectively allowing the miner to precompute an option more favorable to their chances.

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RECOMMENDATION

To maintain block integrity, follow 15 seconds rule, and scale time dependent events accordingly.

RESOLUTION

block.timestamp and block.number are used to provide current timestamp and block numbers only.

They aren't used to calculate chances such as lotteries and jackpots.



Identifier	Definition	Severity
COD-06	Unknown externally owned accounts	Minor

An externally owned accounts (EOA) has no code, and one can send messages from an externally owned account by creating and signing a transaction.

address payable expansion;
payable(0x0FADD969C94974C112D6AFF2fd2C99E229211A3d),
address payable revenuePool;
payable(0x32BC5666677611fC4F5105Bbc110F2969768c321)

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RECOMMENDATION

Private keys of externally owned accounts must be secured carefully.



Identifier	Definition	Severity
COD-10	Third Party Dependencies	Unknown

Smart contract is interacting with third party protocols e.g., Market Makers, Anti-Snipe Contract, Web 3 Applications, Open Zeppelin tools. The scope of the audit treats these entities as black boxes and assumes their functional correctness. However, in the real world, all of them can be compromised, and exploited. Moreover, upgrades in these entities can create severe impacts, e.g., increased transactional fees, deprecation of previous routers, etc.

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RECOMMENDATION

Inspect third party dependencies regularly, and mitigate severe impacts whenever necessary.

ACKNOWLEDGEMENT

Node AI team will inspect third party dependencies regularly, and push updates as required.



Identifier	Definition	Severity
COM-04	Potential resource exhaustion errors	Minor

```
function multiSendTokens(address[] memory accounts, uint256[] memory amounts) external
onlyOwner {
    require(accounts.length == amounts.length, "Lengths do not match.");
    for (uint16 i = 0; i < accounts.length; i++) {
        require(balanceOf(msg.sender) >= amounts[i]*10**_decimals, "Not enough tokens.");
        finalizeTransfer(msg.sender, accounts[i], amounts[i]*10**_decimals, false, false,
true);
    }
}
```

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RECOMMENDATION

Set upper bounds for multi-address calls.

ACKNOWLEDGEMENT

onlyOwner will use multiSendTokens() with a limited accounts to airdrop.



DISCLAIMERS

InterFi Network provides the easy-to-understand audit of solidity source codes (commonly known as smart contracts).

The smart contract for this particular audit was analyzed for common contract vulnerabilities, and centralization exploits. This audit report makes no statements or warranties on the security of the code. This audit report does not provide any warranty or guarantee regarding the absolute bug-free nature of the smart contract analyzed, nor do they provide any indication of the client's business, business model or legal compliance. This audit report does not extend to the compiler layer, any other areas beyond the programming language, or other programming aspects that could present security risks. Cryptographic tokens are emergent technologies, they carry high levels of technical risks and uncertainty. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. This audit report could include false positives, false negatives, and other unpredictable results.

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ABOUT INTERFI NETWORK

InterFi Network provides intelligent blockchain solutions. We provide solidity development, testing, and

auditing services. We have developed 150+ solidity codes, audited 1000+ smart contracts, and

analyzed 500,000+ code lines. We have worked on major public blockchains e.g., Ethereum, Binance,

Cronos, Doge, Polygon, Avalanche, Metis, Fantom, Bitcoin Cash, Velas, Oasis, etc.

InterFi Network is built by engineers, developers, UI experts, and blockchain enthusiasts. Our team

currently consists of 4 core members, and 6+ casual contributors.

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SMART CONTRACT AUDITS | SOLIDITY DEVELOPMENT AND TESTING RELENTLESSLY SECURING PUBLIC AND PRIVATE BLOCKCHAINS