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Neutra Finance

Audit

Security Assessment
12. January, 2023

For



SolidProof_io



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Version	Date	Description
1.0	09. December 2023	<ul style="list-style-type: none">• Layout project• Automated- /Manual-Security Testing• Summary

Network

TBA

Website

<https://neutra.finance/>

Discord

<https://discord.com/invite/h5GxDEAxyY>

Twitter

<https://twitter.com/Neutrafinance>

Medium

<https://medium.com/@neutrafinance>



Description

Neutra Finance aims to make risk-hedged, sustainable investment strategies easily accessible for anyone, anywhere through automated strategy vaults. We strive to make this process simple and easy so that anyone who wants to protect their funds and earn stable returns in any market condition can do so. Upon depositing their capital into our vaults, users can sit back and earn APY above market standards on high-performing DeFi products while the strategy will do the rest, such as optimising returns, rebalancing, and managing liquidation risk.

Project Engagement

During the Date of 09 December 2023, **Neutra Finance Team** engaged Solidproof.io to audit smart contracts that they created. The engagement was technical in nature and focused on identifying security flaws in the design and implementation of the contracts. They provided Solidproof.io with access to their code repository and whitepaper.

Logo



Contract Link

v1.0

<https://github.com/NeutraFinance/neutra-gmx-contracts>

Vulnerability & Risk Level

Risk represents the probability that a certain source-threat will exploit vulnerability, and the impact of that event on the organization or system. Risk Level is computed based on CVSS version 3.0.

Level	Value	Vulnerability	Risk (Required Action)
Critical	9 - 10	A vulnerability that can disrupt the contract functioning in a number of scenarios, or creates a risk that the contract may be broken.	Immediate action to reduce risk level.
High	7 – 8.9	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.	Implementation of corrective actions as soon as possible.
Medium	4 – 6.9	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.	Implementation of corrective actions in a certain period.
Low	2 – 3.9	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.	Implementation of certain corrective actions or accepting the risk.
Informational	0 – 1.9	A vulnerability that have informational character but is not effecting any of the code.	An observation that does not determine a level of risk

Auditing Strategy and Techniques Applied

Throughout the review process, care was taken to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. To do so, reviewed line-by-line by our team of expert pentesters and smart contract developers, documenting any issues as there were discovered.

Methodology

The auditing process follows a routine series of steps:

1. Code review that includes the following:
 - i) Review of the specifications, sources, and instructions provided to SolidProof to make sure we understand the size, scope, and functionality of the smart contract.
 - ii) Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
 - iii) Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to SolidProof describe.
2. Testing and automated analysis that includes the following:
 - i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
 - ii) Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.
3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.
4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts.

Used Code from other Frameworks/Smart Contracts (direct imports)

Imported packages:

Dependency / Import Path	Count
@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol	1
@openzeppelin/contracts-upgradeable/proxy/utils/UUPSUpgradeable.sol	1
@openzeppelin/contracts/security/ReentrancyGuard.sol	8
@openzeppelin/contracts/token/ERC20/ERC20.sol	1
@openzeppelin/contracts/utils/Address.sol	1

Tested Contract Files

This audit covered the following files listed below with a SHA-1 Hash.

A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

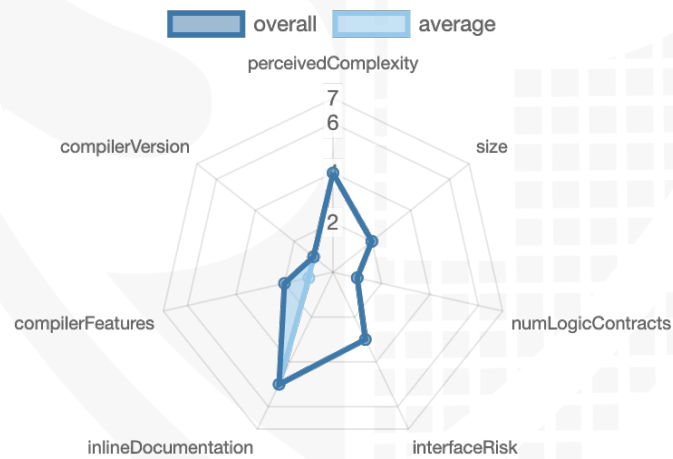
File Name	SHA-1 Hash
contracts/GmxHelper.sol	a54a769134e91c50e37105d098fb73015f8ee832
contracts/Router.sol	75898e31cdebec1ab41742aa894c7982a9b35422
contracts/BatchRouter.sol	ab26f79dcfecc119b0bf4b3b53e2ba4337dca46c
contracts/StrategyVault.sol	1c59c6f2d3cc306fe2e45f2d369dfe68b950c17f

Metrics

Source Lines v1.0



Risk Level v1.0



Capabilities

Components

 Contracts	 Libraries	 Interfaces	 Abstract
19	0	17	1

Exposed Functions

This section lists functions that are explicitly declared public or payable. Please note that getter methods for public stateVars are not included.












 Public	 Payable
390	23

External	Internal	Private	Pure	View
322	326	50	0	162

StateVariables

Total	 Public
252	247

Capabilities

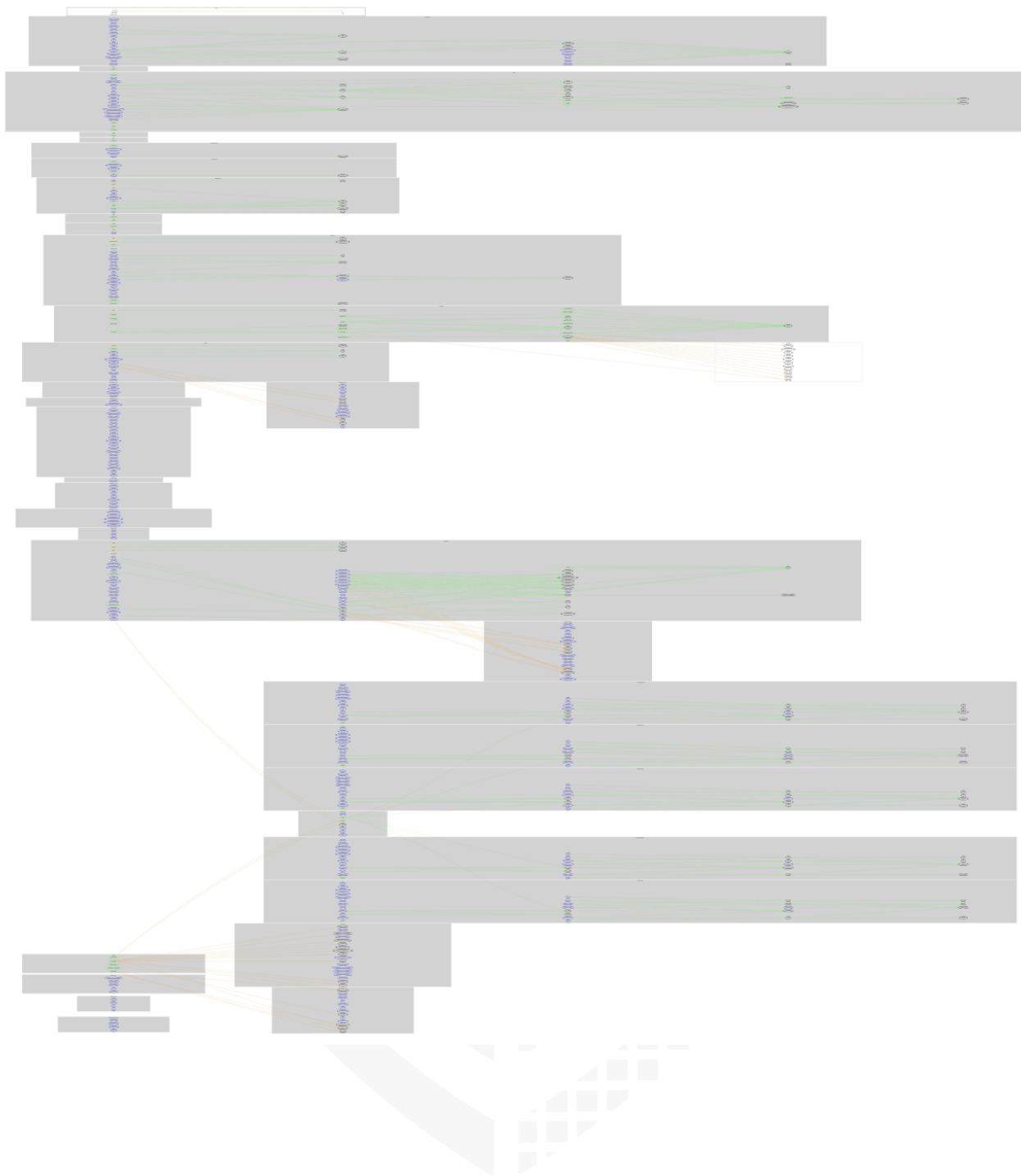
Solidity Versions observed	 Experimental Features	 Can Receive Funds	 Uses Assembly	 Has Destroyable Contracts	
<div>0.8.11</div> <div>^0.8.0</div>		<div>yes</div>	<div></div>	<div></div>	
 Transfers ETH	 Low-Level Calls	 DelegateCall	 Uses Hash Functions	 ECRecover	 New/Create/Create2
<div>yes</div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
 TryCatch	Σ Unchecked				
<div></div>	<div></div>				

Inheritance Graph



CallGraph

v1.0



Scope of Work/Verify Claims

The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Is contract an upgradeable
2. Correct implementation of Token standard
3. Deployer cannot mint any new tokens
4. Deployer cannot burn or lock user funds
5. Deployer cannot pause the contract
6. Deployer cannot set fees
7. Deployer cannot blacklist/antisnipe addresses
8. Overall checkup (Smart Contract Security)

Is contract an upgradeable

Name	
Is contract an upgradeable?	Yes

Comments:

v1.0

- Owner can deploy a new version of the strategy vault contract which can change any limit and give owner new privileges
 - Be aware of this and do your own research for the contract which is the contract pointing to

Correct implementation of Token standard

ERC20				
Function	Description	Exist	Tested	Verified
TotalSupply	Provides information about the total token supply	✓	✓	✓
BalanceOf	Provides account balance of the owner's account	✓	✓	✓
Transfer	Executes transfers of a specified number of tokens to a specified address	✓	✓	✓
TransferFrom	Executes transfers of a specified number of tokens from a specified address	✓	✓	✓
Approve	Allow a spender to withdraw a set number of tokens from a specified account	✓	✓	✓
Allowance	Returns a set number of tokens from a spender to the owner	✓	✓	✓

Deployer cannot mint any new tokens

Name	Exist	Tested	Status
Deployer cannot mint	✓	✓	✓
Max / Total Supply	N/A		

Comments:

v1.0

- Indirect minting is possible by the handler and the gov addresses because in the “Router.sol” contract, the mint function is called 2 times. Once on L102, in the “confirmAndBuy” function and then in the “settle” function. But this is being done in order to collect fees.

Deployer cannot burn or lock user funds

Name	Exist	Tested	Status
Deployer cannot lock	-	-	-
Deployer cannot burn	-	-	-



Deployer cannot pause the contract

Name	Exist	Tested	Status
Deployer cannot pause	—	—	—



Deployer cannot set fees

Name	Exist	Tested	Status
Deployer cannot set fees over 25%	✓	✓	✓
Deployer cannot set fees to nearly 100% or to 100%	✓	✓	✓

Comments:

v1.0

- Fees cannot be set without any limitations

Deployer can blacklist/antisnipe addresses

Name	Exist	Tested	Status
Deployer cannot blacklist/antisnipe addresses	—	—	—



Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓

Legend

Attribute	Symbol
Verified / Checked	✓
Partly Verified	⚠
Unverified / Not checked	✗
Not available	—

Modifiers and public functions v1.0

- ◆ approveToken
- Ⓜ onlyGov
- ◆ reserveDeposit
- ◆ reserveWithdraw
- ◆ cancelDeposit
- ◆ cancelWithdraw
- ◆ claimWant
- ◆ claimStakedNeuGlp
- ◆ claim
- ◆ executeBatchPositions
- Ⓜ onlyGov
- ◆ confirmAndDealGlp
- Ⓜ onlyGov
- ◆ setRouter
- Ⓜ onlyGov
- ◆ setDepositLimit
- Ⓜ onlyGov
- ◆ setTrackers
- Ⓜ onlyGov
- ◆ setExecutionFee
- Ⓜ onlyGov

- ◆ approveToken
- Ⓜ onlyGov
- ◆ setHandler
- Ⓜ onlyGov
- ◆ executePositionsBeforeDealGlp
- Ⓜ onlyHandler
- ◆ confirmAndBuy
- Ⓜ onlyHandler
- ◆ confirmAndSell
- Ⓜ onlyHandler
- ◆ settle
- Ⓜ onlyGov
- ◆ setExecutionFee
- Ⓜ onlyGov
- ◆ setIsSale
- Ⓜ onlyGov
- ◆ setTrackers
- Ⓜ onlyGov

- ⚡ initialize
- Ⓜ initializer
- ⚡ minimiseDeltaWithBuyGlp 💰
- Ⓜ onlyKeepers
- ⚡ minimiseDeltaWithSellGlp 💰
- Ⓜ onlyKeepers
- ⚡ executeIncreasePositions 💰
- Ⓜ onlyRouter
- ⚡ executeDecreasePositions 💰
- Ⓜ onlyRouter
- ⚡ retryPositions 💰
- Ⓜ onlyKeepers
- ⚡ buyNeuGlp
- Ⓜ onlyRouter
- ⚡ sellNeuGlp
- Ⓜ onlyRouter
- ⚡ confirm
- Ⓜ onlyRouter
- ⚡ confirmRebalance
- Ⓜ onlyKeepers
- ⚡ harvest
- ⚡ activateManagementFee
- Ⓜ onlyGov
- ⚡ deactivateManagementFee
- Ⓜ onlyGov
- ⚡ repayFundingFee 💰
- Ⓜ onlyKeepers
- ⚡ exitStrategy 💰
- Ⓜ onlyGov
- ⚡ settle

- ⚡ depositInsuranceFund
- Ⓜ onlyGov
- ⚡ buyGlp
- Ⓜ onlyKeepers
- ⚡ sellGlp
- Ⓜ onlyKeepers
- ⚡ increaseShortPosition 💰
- Ⓜ onlyKeepers
- ⚡ decreaseShortPosition 💰
- Ⓜ onlyKeepers
- ⚡ setGmxHelper
- Ⓜ onlyGov
- ⚡ setMarginFeeBasisPoints
- Ⓜ onlyGov
- ⚡ setKeeper
- Ⓜ onlyGov
- ⚡ setWant
- Ⓜ onlyGov
- ⚡ setExecutionFee
- Ⓜ onlyGov
- ⚡ setCallbackTarget
- Ⓜ onlyGov

- ⚡ setDepositLimit
- Ⓜ onlyGov
- ⚡ setRouter
- Ⓜ onlyGov
- ⚡ setManagement
- Ⓜ onlyGov
- ⚡ registerAndSetReferralCode
- Ⓜ onlyGov
- ⚡ repayUnpaidFundingFee 💰
- Ⓜ onlyKeepers
- ⚡ withdrawFees
- Ⓜ onlyGov
- ⚡ withdrawInsuranceFund
- Ⓜ onlyGov
- ⚡ rescueFunds
- Ⓜ onlyGov
- ⚡ withdrawEth 💰
- Ⓜ onlyGov

Comments

StrategyVault.sol

- Deployer can set variables without any following state limitations
 - Deposit Limit
 - Execution Fee
 - Margin Fees Basis Point
 - Execute Positions
 - Set Sales
 -
- Deployer can set following addresses
 - Router
 - Tracker
 - Handler
- Existing Modifiers
- Gov address can do the following in the strategy vault:
 - can withdraw contract balance
 - can transfer any type of tokens from the contract to itself
 - can transfer any type of tokens to an arbitrary address
 - can set fees without limitations and can also set management address to zero address. Recommendation: Zero address check, otherwise the logic of the contract will not work as supposed to be
 - Can set deposit limit to any arbitrary value
- There are several authorities which are authorized to call some functions, that means, if the owner is renounced, another address is still authorized to call functions
 - Be aware of this

Source Units in Scope v1.0

File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score
contracts/interfaces/IRewardDistributor.sol	—————	1	13	6	3	1	9
contracts/interfaces/IRouter.sol	—————	1	15	6	3	1	10
contracts/interfaces/IStrategyVault.sol	—————	1	31	6	3	1	42
contracts/GmxHelper.sol	1	—————	217	214	169	5	177
contracts/Router.sol	1	—————	175	175	115	18	123

Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalised lines of the source unit (e.g. normalises functions spanning multiple lines)
nSLOC	normalised source lines of code (only source-code lines; no comments, no blank lines)
Comment Lines	lines containing single or block comments
Complexity Score	a custom complexity score derived from code statements that are known to introduce code complexity (branches, loops, calls, external interfaces, ...)

Audit Results

Critical issues

No critical issues

High issues

No high issues

Medium issues

No medium issues

Low issues

No low issues

Informational issues

Issue	File	Type	Line	Description
#1	All	NatSpec documentation missing	-	If you started to comment your code, also comment all other functions, variables etc.

Audit Comments

We recommend you to use the special form of comments (NatSpec Format, Follow link for more information <https://docs.soliditylang.org/en/latest/natspec-format.html>) for your contracts to provide rich documentation for functions, return variables and more. This helps investors to make clear what that variables, functions etc. do.

12. December 2023:

- There is still an owner (Owner still has not renounced ownership)
- Owner can deploy a new version of the contract which can change any limit and give owner new privileges
- Read whole report and modifiers section for more information

SWC Attacks

ID	Title	Relationships	Status
SW C-1 36	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
SW C-1 35	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
SW C-1 34	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
SW C-1 33	Hash Collisions With Multiple Variable Length Arguments	CWE-294: Authentication Bypass by Capture-replay	PASSED
SW C-1 32	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
SW C-1 31	Presence of unused variables	CWE-1164: Irrelevant Code	PASSED
SW C-1 30	Right-To-Left-Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
SW C-1 29	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
SW C-1 28	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SW C-1 27	Arbitrary Jump with Function Type Variable	CWE-695: Use of Low-Level Functionality	PASSED
SW C-1 25	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
SW C-1 24	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
SW C-1 23	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
SW C-1 22	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
SW C-1 21	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
SW C-1 20	Weak Sources of Randomness from Chain Attributes	CWE-330: Use of Insufficiently Random Values	PASSED
SW C-11 9	Shadowing State Variables	CWE-710: Improper Adherence to Coding Standards	PASSED
SW C-11 8	Incorrect Constructor Name	CWE-665: Improper Initialization	PASSED
SW C-11 7	Signature Malleability	CWE-347: Improper Verification of Cryptographic Signature	PASSED

SW C-11 6	Timestamp Dependence	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SW C-11 5	Authorization through tx.origin	CWE-477: Use of Obsolete Function	PASSED
SW C-11 4	Transaction Order Dependence	CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')	PASSED
SW C-11 3	DoS with Failed Call	CWE-703: Improper Check or Handling of Exceptional Conditions	PASSED
SW C-11 2	Delegatecall to Untrusted Callee	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SW C-11 1	Use of Deprecated Solidity Functions	CWE-477: Use of Obsolete Function	PASSED
SW C-11 0	Assert Violation	CWE-670: Always-Incorrect Control Flow Implementation	PASSED
SW C-1 09	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
SW C-1 08	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED
SW C-1 07	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SW C-1 06	Unprotected SELFDESTRUCT Instruction	CWE-284: Improper Access Control	PASSED

SW C-1 05	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
SW C-1 04	Unchecked Call Return Value	CWE-252: Unchecked Return Value	PASSED
SW C-1 03	Floating Pragma	CWE-664: Improper Control of a Resource Through its Lifetime	PASSED
SW C-1 02	Outdated Compiler Version	CWE-937: Using Components with Known Vulnerabilities	PASSED
SW C-1 01	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
SW C-1 00	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED



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