QuillAudits

Audit Report
January, 2023

For

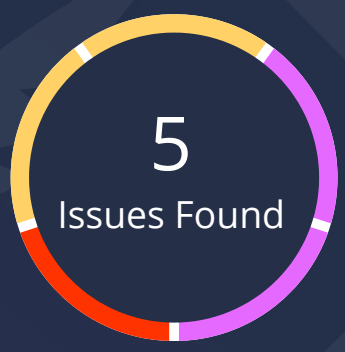
edverse

Table of Content

Executive Summary

Project Name	Edverse
Timeline	29th Sep, 2022 to 8th Oct 2022
Method	Manual Review, Functional Testing, Automated Testing etc.
Scope of Audit	The scope of this audit was to analyse and document the Edverse Vesting smart contract codebase for quality, security, and correctness.
Codebase	*https://mumbai.polygonscan.com/address/0x0e34e5ee609e0e33c093ad47e55cbb62de705e25#code* *https://mumbai.polygonscan.com/address/0x6a1d3577645fea68637fd7da55385a79128c1401#code*
Fixed In	*https://mumbai.polygonscan.com/address/0x50e0ec8b1872d48bf25937ecab40ba37ca0a1249#code* *https://mumbai.polygonscan.com/address/0x953047313543d62202be73d8ee4e6b8d05138454#code*

Note: contract MultiSigWallet inside "0x50E0ec8b1872d48BF25937ecAB40Ba37cA0A1249" is out of Audit Scope



High Medium Low Informational

	High	Medium	Low	Informational
Open Issues	0	0	0	0
Acknowledged Issues	1	1	0	2
Partially Resolved Issues	0	0	0	0
Resolved Issues	0	1	0	0

Types of Severities

High

A high severity issue or vulnerability means that your smart contract can be exploited. Issues on this level are critical to the smart contract's performance or functionality, and we recommend these issues be fixed before moving to a live environment.

Medium

The issues marked as medium severity usually arise because of errors and deficiencies in the smart contract code. Issues on this level could potentially bring problems, and they should still be fixed.

Low

Low-level severity issues can cause minor impact and or are just warnings that can remain unfixed for now. It would be better to fix these issues at some point in the future.

Informational

These are severity issues that indicate an improvement request, a general question, a cosmetic or documentation error, or a request for information. There is low-to-no impact.

Types of Issues

Open

Security vulnerabilities identified that must be resolved and are currently unresolved.

Resolved

These are the issues identified in the initial audit and have been successfully fixed.

Acknowledged

Vulnerabilities which have been acknowledged but are yet to be resolved.

Partially Resolved

Considerable efforts have been invested to reduce the risk/impact of the security issue, but are not completely resolved.

Checked Vulnerabilities

- Re-entrancy
- Timestamp Dependence
- Gas Limit and Loops
- Exception Disorder
- Gasless Send
- Use of tx.origin
- Compiler version not fixed
- Address hardcoded
- Divide before multiply
- Integer overflow/underflow
- Dangerous strict equalities
- Tautology or contradiction
- Return values of low-level calls
- Missing Zero Address Validation
- Private modifier
- Revert/require functions
- Using block.timestamp
- Multiple Sends
- Using SHA3
- Using suicide
- Using throw
- Using inline assembly

Techniques and Methods

Throughout the audit of smart contract, care was taken to ensure:

- The overall quality of code.
- Use of best practices.
- Code documentation and comments match logic and expected behaviour.
- Token distribution and calculations are as per the intended behaviour mentioned in the whitepaper.
- Implementation of ERC-20 token standards.
- Efficient use of gas.
- Code is safe from re-entrancy and other vulnerabilities.

The following techniques, methods and tools were used to review all the smart contracts.

Structural Analysis

In this step, we have analysed the design patterns and structure of smart contracts. A thorough check was done to ensure the smart contract is structured in a way that will not result in future problems.

Static Analysis

Static analysis of smart contracts was done to identify contract vulnerabilities. In this step, a series of automated tools are used to test the security of smart contracts.

Code Review / Manual Analysis

Manual analysis or review of code was done to identify new vulnerabilities or verify the vulnerabilities found during the static analysis. Contracts were completely manually analysed, their logic was checked and compared with the one described in the whitepaper. Besides, the results of the automated analysis were manually verified.

Gas Consumption

In this step, we have checked the behaviour of smart contracts in production. Checks were done to know how much gas gets consumed and the possibilities of optimization of code to reduce gas consumption.

Tools and Platforms used for Audit

Remix IDE, Truffle, Truffle Team, Solhint, Mythril, Slither, Solidity statistic analysis.

Manual Testing

High Severity Issues

1. Centralization Related Risks

Description
Any compromise to the owner's privileged accounts may allow a hacker to take advantage of this authority and manipulate the Edverse Vesting contract. The only owner controller function can be manipulate if there is a compromise in the owner account.

Recommendation
The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralisation, which in most cases cannot be resolved entirely at the present stage. We advise the Edverse team to carefully manage the privileged account's private key to avoid any potential risks of being hacked.

In general, we strongly recommend centralised privileges or roles in the Vesting contract to be improved via a decentralised mechanism or smart-contract-based accounts with enhanced security practices, e.g., multi-signature wallets.

Edverse Team Comment
Post minting we will integrate gnosis with the admin wallet so that additional security is there.

Status
Acknowledged

Medium Severity Issues

2. Check for start time is missing

Description
Check for start time in vesting period is missing if the owner is malicious he can start earlier and do favouritism for any beneficiary address to get more tokens then allowed for vesting.

Recommendation
The start time should always be more than the current time (block.timestamp). We recommend to use the require check for the same.

Edverse team Comment
We have a vesting schedule for seed, private and public rounds only which will be completed before listing. Any tokens issued later on by the treasury will have no vesting period and hence there is no chance of malicious intentions.

Status

Acknowledged

3. Token code address is not present on mainnet/tesnet

Description
The _token variable address used is not present on Mainnet/testnet on polygon and recommend to use correct address to remove the failures of call.

Note: When deploying the contract to Mainnet, the hardcoded token address must be updated to reflect the newly deployed token address on Mainnet.

Status

Resolved

Low Severity Issues

No issues found

Informational Issues

4. Recommendations and Gas optimizations

1. For test stake use smock Library.
2. Gas optimization
   - safeMath wrapper is been built from solc version 0.8.0 onwards so we recommend to remove safeMath external library.
   - this.getWithdrawbleAmount and this.computeNextVestingScheduleForHolder uses this keyword to call the function. The keyword this return the context of current contract and then it calls the function which is an inefficient way and consume more gas.
     It's always better to call directly functions and define visibility accordingly for functions.
   - The pre-increment operation is cheaper (about 5 GAS per iteration) so use ++i instead of i++ or i+= 1 in for loop. We recommend to use pre-increment in all the for loops.
   - Instead of using the && operator in a single require statement to check multiple conditions,using multiple require statements with 1 condition per require statement will save 3 GAS per &&. We recommend to implement in all the contracts.
   - In for loop the default value initilization to 0 should not be there remove from all the for loop
   - != 0 costs 6 less GAS compared to > 0 for unsigned integers in require statements with the optimizer enabled. We recommend to use !=0 instead of > 0 in all the contracts.
   - In the EVM, there is no opcode for non-strict inequalities (>=, <=) and two operations are performed (> + =.) Consider replacing >= with the strict counterpart >. Recommend to follow the inequality with a strict one.
   - Explicit set of values to there default state at the time of declaration is wastage of gas units.
   - All the public functions which are not used internally needs to be converted to external
3. When the state gets updated the event should always get fired. We recommend to fire the events for all the state changes.

Status

Acknowledged

9. Unit test cases are not present

Description
Unit Test cases for the code are missing. We recommend to make unit test with 100% coverage. It’s good practice to cover user based scenarios in these type of tests.

Edverse Team Comment
We had agreed initially only that test cases are not possible.
Testing is done on Remix Internally,Remix is equivalent to Hardhat and used widely in the industry. Since, unit test cases are not possible in remix, we have not shared the same.

Status

Acknowledged

Automated Tests

```
TestToken.withdrawTestToken(address,uint256) (TestToken.sol#673-675) ignores return value by this.transfer
(wallet,token) (TestToken.sol#674)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#unchecked-transfer

TestToken.allowance(address,address).owner (TestToken.sol#465) shadows:
        - Ownable.owner() (TestToken.sol#331-333) (function)
TestToken._approve(address,address,uint256).owner (TestToken.sol#641) shadows:
        - Ownable.owner() (TestToken.sol#331-333) (function)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#local-variable-shadowing

Context._msgData() (TestToken.sol#132-135) is never used and should be removed
SafeMath.div(uint256,uint256) (TestToken.sol#235-237) is never used and should be removed
SafeMath.div(uint256,uint256,string) (TestToken.sol#250-261) is never used and should be removed
SafeMath.mod(uint256,uint256) (TestToken.sol#274-276) is never used and should be removed
SafeMath.mod(uint256,uint256,string) (TestToken.sol#289-296) is never used and should be removed
SafeMath.mul(uint256,uint256) (TestToken.sol#210-222) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code

Pragma version>=0.4.22<0.9.0 (TestToken.sol#7) is too complex
solc-0.8.9 is not recommended for deployment
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Parameter TestToken.burn(uint256)._amount (TestToken.sol#656) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-co
nventions

Redundant expression "this (TestToken.sol#133)" inContext (TestToken.sol#123-136)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#redundant-statements

TestToken.constructor() (TestToken.sol#387-396) uses literals with too many digits:
        - _totalSupply = 1000000000 * (10 ** 18) (TestToken.sol#391)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits

renounceOwnership() should be declared external:
        - Ownable.renounceOwnership() (TestToken.sol#350-353)
transferOwnership(address) should be declared external:
        - Ownable.transferOwnership(address) (TestToken.sol#359-361)
increaseAllowance(address,uint256) should be declared external:
        - TestToken.increaseAllowance(address,uint256) (TestToken.sol#531-541)
decreaseAllowance(address,uint256) should be declared external:
        - TestToken.decreaseAllowance(address,uint256) (TestToken.sol#557-570)
burn(uint256) should be declared external:
        - TestToken.burn(uint256) (TestToken.sol#656-658)
transferAnyBSC20Token(address,uint256) should be declared external:
        - TestToken.transferAnyBSC20Token(address,uint256) (TestToken.sol#684-686)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-dec
lared-external
TestToken.sol analyzed (5 contracts with 75 detectors), 20 result(s) found
ethsec@692148d5f25d:/code$
```

```
ethsec@692148d5f25d:/code$ slither TestTokenVesting.sol

Reentrancy in TestTokenVesting.revoke(bytes32) (TestTokenVesting.sol#904-917):
        External calls:
        - release(vestingScheduleId,vestedAmount) (TestTokenVesting.sol#912)
                - returndata = address(token).functionCall(data,SafeERC20: low-level call failed) (TestTok
enVesting.sol#394)
                - (success,returndata) = target.call{value: value}(data) (TestTokenVesting.sol#222)
                - _token.safeTransfer(beneficiaryPayable,amount) (TestTokenVesting.sol#944)
        External calls sending eth:
        - release(vestingScheduleId,vestedAmount) (TestTokenVesting.sol#912)
                - (success,returndata) = target.call{value: value}(data) (TestTokenVesting.sol#222)
        State variables written after the call(s):
        - vestingSchedule.revoked = true (TestTokenVesting.sol#916)
        - vestingSchedulesTotalAmount = vestingSchedulesTotalAmount.sub(unreleased) (TestTokenVesting.sol#
915)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities

TestTokenVesting._computeReleasableAmount(TestTokenVesting.VestingSchedule) (TestTokenVesting.sol#1027-104
5) performs a multiplication on the result of a division:
        -vestedSlicePeriods = timeFromStart.div(secondsPerSlice) (TestTokenVesting.sol#1039)
        -vestedSeconds = vestedSlicePeriods.mul(secondsPerSlice) (TestTokenVesting.sol#1040)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#divide-before-multiply

TestTokenVesting.onlyIfVestingScheduleExists(bytes32) (TestTokenVesting.sol#771-774) uses a dangerous stri
ct equality:
        - require(bool)(vestingSchedules[vestingScheduleId].initialized == true) (TestTokenVesting.sol#772
)
TestTokenVesting.onlyIfVestingScheduleNotRevoked(bytes32) (TestTokenVesting.sol#779-783) uses a dangerous
strict equality:
        - require(bool)(vestingSchedules[vestingScheduleId].initialized == true) (TestTokenVesting.sol#780
)
TestTokenVesting.onlyIfVestingScheduleNotRevoked(bytes32) (TestTokenVesting.sol#779-783) uses a dangerous
strict equality:
        - require(bool)(vestingSchedules[vestingScheduleId].revoked == false) (TestTokenVesting.sol#781)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dangerous-strict-equalities

TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256) (TestTokenVes
ting.sol#862-898) should emit an event for:
        - vestingSchedulesTotalAmount = vestingSchedulesTotalAmount.add(_amount) (TestTokenVesting.sol#894
)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#missing-events-arithmetic

TestTokenVesting.revoke(bytes32) (TestTokenVesting.sol#904-917) uses timestamp for comparisons
        Dangerous comparisons:
        - vestedAmount > 0 (TestTokenVesting.sol#911)
TestTokenVesting.release(bytes32,uint256) (TestTokenVesting.sol#925-945) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(vestedAmount >= amount,TokenVesting: cannot release tokens, not enough vest
ed tokens) (TestTokenVesting.sol#940)
TestTokenVesting._computeReleasableAmount(TestTokenVesting.VestingSchedule) (TestTokenVesting.sol#1027-104
5) uses timestamp for comparisons
        Dangerous comparisons:
        - (currentTime < vestingSchedule.cliff) || vestingSchedule.revoked == true (TestTokenVesting.sol#1
032)
        - currentTime >= vestingSchedule.start.add(vestingSchedule.duration) (TestTokenVesting.sol#1034)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#block-timestamp

Address.verifyCallResult(bool,bytes,string) (TestTokenVesting.sol#286-306) uses assembly
        - INLINE ASM (TestTokenVesting.sol#298-301)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage
```

```
Address.verifyCallResult(bool,bytes,string) (TestTokenVesting.sol#286-306) uses assembly
        - INLINE ASM (TestTokenVesting.sol#298-301)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage

TestTokenVesting.revoke(bytes32) (TestTokenVesting.sol#904-917) compares to a boolean constant:
        -require(bool,string)(vestingSchedule.revocable == true,TokenVesting: vesting is not revocable) (T
estTokenVesting.sol#909)
TestTokenVesting._computeReleasableAmount(TestTokenVesting.VestingSchedule) (TestTokenVesting.sol#1027-104
5) compares to a boolean constant:
        -(currentTime < vestingSchedule.cliff) || vestingSchedule.revoked == true (TestTokenVesting.sol#10
32)
TestTokenVesting.onlyIfVestingScheduleExists(bytes32) (TestTokenVesting.sol#771-774) compares to a boolean
 constant:
        -require(bool)(vestingSchedules[vestingScheduleId].initialized == true) (TestTokenVesting.sol#772)
TestTokenVesting.onlyIfVestingScheduleNotRevoked(bytes32) (TestTokenVesting.sol#779-783) compares to a boo
lean constant:
        -require(bool)(vestingSchedules[vestingScheduleId].revoked == false) (TestTokenVesting.sol#781)
TestTokenVesting.onlyIfVestingScheduleNotRevoked(bytes32) (TestTokenVesting.sol#779-783) compares to a boo
lean constant:
        -require(bool)(vestingSchedules[vestingScheduleId].initialized == true) (TestTokenVesting.sol#780)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#boolean-equality

Address.functionCall(address,bytes) (TestTokenVesting.sol#170-172) is never used and should be removed
Address.functionCallWithValue(address,bytes,uint256) (TestTokenVesting.sol#199-205) is never used and shou
ld be removed
Address.functionDelegateCall(address,bytes) (TestTokenVesting.sol#259-261) is never used and should be rem
oved
Address.functionDelegateCall(address,bytes,string) (TestTokenVesting.sol#269-278) is never used and should
 be removed
Address.functionStaticCall(address,bytes) (TestTokenVesting.sol#232-234) is never used and should be remov
ed
Address.functionStaticCall(address,bytes,string) (TestTokenVesting.sol#242-251) is never used and should b
e removed
Address.sendValue(address,uint256) (TestTokenVesting.sol#145-150) is never used and should be removed
Context._msgData() (TestTokenVesting.sol#485-488) is never used and should be removed
SafeERC20.safeApprove(IERC20,address,uint256) (TestTokenVesting.sol#346-359) is never used and should be r
emoved
SafeERC20.safeDecreaseAllowance(IERC20,address,uint256) (TestTokenVesting.sol#370-381) is never used and s
hould be removed
SafeERC20.safeIncreaseAllowance(IERC20,address,uint256) (TestTokenVesting.sol#361-368) is never used and s
hould be removed
SafeERC20.safeTransferFrom(IERC20,address,address,uint256) (TestTokenVesting.sol#330-337) is never used an
d should be removed
SafeMath.mod(uint256,uint256) (TestTokenVesting.sol#627-629) is never used and should be removed
SafeMath.mod(uint256,uint256,string) (TestTokenVesting.sol#642-649) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code

Pragma version0.8.9 (TestTokenVesting.sol#7) necessitates a version too recent to be trusted. Consider dep
loying with 0.6.12/0.7.6
solc-0.8.9 is not recommended for deployment
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in Address.sendValue(address,uint256) (TestTokenVesting.sol#145-150):
        - (success) = recipient.call{value: amount}() (TestTokenVesting.sol#148)
Low level call in Address.functionCallWithValue(address,bytes,uint256,string) (TestTokenVesting.sol#213-22
4):
        - (success,returndata) = target.call{value: value}(data) (TestTokenVesting.sol#222)
Low level call in Address.functionStaticCall(address,bytes,string) (TestTokenVesting.sol#242-251):
        - (success,returndata) = target.staticcall(data) (TestTokenVesting.sol#249)
Low level call in Address.functionDelegateCall(address,bytes,string) (TestTokenVesting.sol#269-278):
        - (success,returndata) = target.delegatecall(data) (TestTokenVesting.sol#276)
```

```
Low level call in Address.functionCallWithValue(address,bytes,uint256,string) (TestTokenVesting.sol#213-224):
        - (success,returndata) = target.call{value: value}(data) (TestTokenVesting.sol#222)
Low level call in Address.functionStaticCall(address,bytes,string) (TestTokenVesting.sol#242-251):
        - (success,returndata) = target.staticcall(data) (TestTokenVesting.sol#249)
Low level call in Address.functionDelegateCall(address,bytes,string) (TestTokenVesting.sol#269-278):
        - (success,returndata) = target.delegatecall(data) (TestTokenVesting.sol#276)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Parameter TestTokenVesting.getVestingSchedulesCountByBeneficiary(address)._beneficiary (TestTokenVesting.sol#799) is not in mixedCase
Parameter TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256)._beneficiary (TestTokenVesting.sol#863) is not in mixedCase
Parameter TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256)._start (TestTokenVesting.sol#864) is not in mixedCase
Parameter TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256)._cliff (TestTokenVesting.sol#865) is not in mixedCase
Parameter TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256)._duration (TestTokenVesting.sol#866) is not in mixedCase
Parameter TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256)._slicePeriodSeconds (TestTokenVesting.sol#867) is not in mixedCase
Parameter TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256)._revocable (TestTokenVesting.sol#868) is not in mixedCase
Parameter TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256)._amount (TestTokenVesting.sol#869) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

Redundant expression "this (TestTokenVesting.sol#486)" inContext (TestTokenVesting.sol#476-489)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#redundant-statements

renounceOwnership() should be declared external:
        - Ownable.renounceOwnership() (TestTokenVesting.sol#703-706)
transferOwnership(address) should be declared external:
        - Ownable.transferOwnership(address) (TestTokenVesting.sol#712-714)
createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256) should be declared external:
        - TestTokenVesting.createVestingSchedule(address,uint256,uint256,uint256,uint256,bool,uint256) (TestTokenVesting.sol#862-898)
revoke(bytes32) should be declared external:
        - TestTokenVesting.revoke(bytes32) (TestTokenVesting.sol#904-917)
computeReleasableAmount(bytes32) should be declared external:
        - TestTokenVesting.computeReleasableAmount(bytes32) (TestTokenVesting.sol#962-969)
getWithdrawableAmount() should be declared external:
        - TestTokenVesting.getWithdrawableAmount() (TestTokenVesting.sol#986-991)
computeNextVestingScheduleIdForHolder(address) should be declared external:
        - TestTokenVesting.computeNextVestingScheduleIdForHolder(address) (TestTokenVesting.sol#996-1001)
getLastVestingScheduleForHolder(address) should be declared external:
        - TestTokenVesting.getLastVestingScheduleForHolder(address) (TestTokenVesting.sol#1006-1011)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external
TestTokenVesting.sol analyzed (8 contracts with 75 detectors), 52 result(s) found
ethsec@692148d5f25d:/code$
```

Results

TestVesting.sol: There were analyzed (8 contracts with 75 detectors), 52 result(s) found.
TestToken.sol: There were analyzed (5 contracts with 75 detectors), 20 result(s) found.
via Slither for the Edverse contracts, and we checked through all of them and found them to be false positives.

Closing Summary

In this report, we have considered the security of the Edverse Vesting contract. We performed our audit according to the procedure described above.

One high, two medium and two informational issues are found in the Initial audit and Edverse Team Resolved One Issue and Acknowledged others.

Disclaimer

QuillAudits smart contract audit is not a security warranty, investment advice, or an endorsement of the Edverse Vesting contract. This audit does not provide a security or correctness guarantee of the audited smart contracts.

The statements made in this document should not be interpreted as investment or legal advice, nor should its authors be held accountable for decisions made based on them. Securing smart contracts is a multistep process. One audit cannot be considered enough. We recommend that the Edverse Vesting put in place a bug bounty program to encourage further analysis of the smart contract by other third parties.

About QuillAudits

QuillAudits is a secure smart contracts audit platform designed by QuillHash Technologies. We are a team of dedicated blockchain security experts and smart contract auditors determined to ensure that Smart Contract-based Web3 projects can avail the latest and best security solutions to operate in a trustworthy and risk-free ecosystem.

700+
Audits Completed

$16B
Secured

700K
Lines of Code Audited

Follow Our Journey

Audit Report
January, 2023

For

edverse

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