

AVATAR

SMART CONTRACT AUDIT REPORT



Prepared by:
BlockAudit

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Visit : www.blockaudit.report



TABLE OF CONTENTS

INTRODUCTION	2-3
└── Summary	2
└── Overview	3
FINDINGS	4-10
└── Finding Overview	4
└── A5CM01	5
└── A5C01	7
└── A5C02	8
└── A5M01 / A5EX2	10
FINDINGS	11
DISCLAIMERS	13
ABOUT	15





SUMMARY

This Audit Report mainly focuses on the extensive security of **Avatar** Smart Contracts. With this report, we attempt to ensure the reliability and correctness of the smart contract by complete and rigorous assessment of the system's architecture and the smart contract codebase.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.



OVERVIEW

Project Summary

Project Name	Avatar
Logo	 AVATAR
Language	Solidity
Platform	Polygon
Contract Addresses	https://polygonscan.com/ address/0x4cd4463e43bb88ee366b4f88160beeab39d34ed7#code https://polygonscan.com/ address/0xbcc99c5c5f7078f076b9218bfa748a5e099eec5c0#code https://polygonscan.com/ address/0x71ddc5ea37ede029b384c274abfa7b7a05a9f40d#code

File Summary

ID	File Name
A5C	A5CO-A5Core.sol
A5EX	A5EXO-A5Ex.sol
A5EX2	A5EX20-A5Ex2.sol
A5M	A5MO-A5Main.sol
A5CM	A5CMO-A5Combine.sol

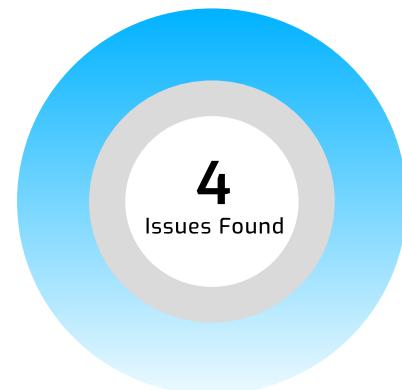
Date of Delivery	20 Oct 2023
Audit Methodology	Code Analysis. Automatic Assessment, Manual Review
Audit Result	Passed ✓
Audit Team	BlockAudit Report Team





FINDINGS

■ Critical	0 0.0%
■ High	0 0.0%
■ Medium	0 0.0%
■ Low	0 0.0%
■ Informational	4 100.0%
■ Ownership	0 0.0%



Vulnerability Findings Summary

ID	Type	Instances	Severity	Status
A5CM01	Contract Code Size Exceeds Limit	-	■ Informational	Acknowledged
A5C01	State variables that could be declared constant	448	■ Informational	Acknowledged
A5C02	Dead Code / Unused State Variables	441 / 443 / 1120-1122	■ Informational	Acknowledged
A5M01 / A5EX2	High Cyclomatic complexity	539-626 / 970-1167	■ Informational	Acknowledged



A5CM01

Type	Contract code size exceeds Limit
Severity	■ Informational
File	A5Combine.sol
Instances	-
Status	Acknowledged

Description

On November 22, 2016 the Spurious Dragon hard-fork introduced [EIP-170](#) which added a smart contract size limit of 24.576 kb which A5Combine contract exceeds and can cause problems when deploying it.

Remediation

There are many ways to optimize smart contract's code which you can explore through the following link: [DOWNSIZING CONTRACTS TO FIGHT THE CONTRACT SIZE LIMIT](#)

Snapshot

```
Warning: Contract code size
exceeds 24576 bytes (a limit
introduced in Spurious Dragon).
This contract may not be
deployable on mainnet. Consider
enabling the optimizer (with a
low "runs" value!), turning off
revert strings, or using
libraries.
-->
contracts/A5Combine.sol:13:1:
|
13 | contract A5Combine is
| A5Main, A5Ext, A5Ext2 {
| ^ (Relevant source part
starts here and spans across
multiple lines).
```



A5C01

Type	State variables that could be declared constant
Severity	■ Informational
File	A5Core.sol
Instances	448
Status	Acknowledged

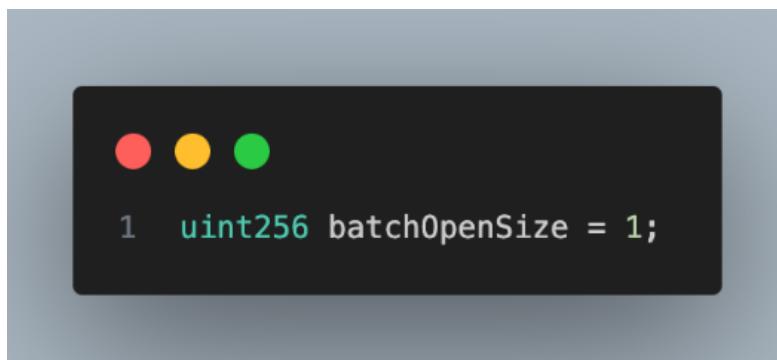
Description

State variables that are not updated following deployment should be declared constant to save gas

Remediation

Add the constant attribute to state variables that never change.

Snapshot



```
1 uint256 batchOpenSize = 1;
```



A5C02

Type	Dead Code and Unused state Variables
Severity	■ Informational
File	A5Core.sol
Instances	441 / 443 / 1120-1122
Status	Acknowledged

Description

_poolHasRunningRound(Pool storage pool) & INVEST_DRATION_MULTIPLIER & gasFeeAutoDuration are declared but were never used across all the contracts so it is dead code.

Remediation

Remove unused functions and state variables to save gas and improve readability.

Snapshot



```
1 uint256 public gasFeeAutoDuration;
```



```
1 uint256 constant INVEST_DRATION_MULTIPLIER = 7; // 7 hours
```



```
1 function _poolHasRunningRound(Pool storage pool) internal view returns (bool) {
2     return pool.roundCount > 0 && pool.rounds[pool.roundCount - 1].timeLockedFund.stopLossBlockId == 0;
3 }
```



A5M01 / A5EX2

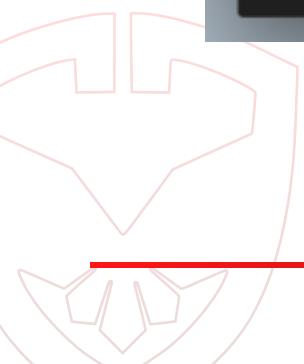
Type	High Cyclomatic complexity
Severity	■ Informational
File	A5Main.sol / A5Ext2.sol
Instances	539-626 / 970-1167
Status	Acknowledged

Description

universalTriggerV2(uint256,uint256,uint256) &
_distributeTimeLockedDynamic(A5Core.Round,A5Core.PositionInfo,uint256,uint256) have a high cyclomatic complexity of 12 and 18 respectively which is not advised for readability and optimization purposes.

Remediation

break up the function into smaller helper functions to improve readability and gas consumption

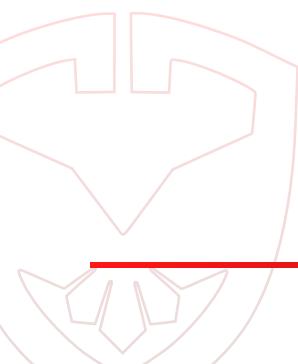


```
function universalTriggerV2(uint256 tokenId, uint256 poolId, uint256 batchSize) public onlyNotStopped {
    // check stoploss
    // _checkAndUpdateTargetBlock
    // trigger updating target volume
    // trigger opening position
    // - reinvest
    // - queue
    // trigger queueing reward distribution
    require(tables[tokenId].pools[poolId].roundCount > 0, "no active round");
    uint256 roundId = tables[tokenId].pools[poolId].roundCount - 1;
    Pool storage pool = tables[tokenId].pools[poolId];
    Round storage round = pool.rounds[roundId];
    ...
    uint256 roundBlockNumber = _getRoundBlockNumber(round);
    uint256 oldPausedBlockNumber = round.pausedBlockNumber + round.empowerPausedBlockNumber;
    uint256 stopLossBlockId;
```



Snapshot

```
● ○ ● ●  
1   function _distributeTimeLockedDynamic(  
2     Round storage round,  
3     PositionInfo storage pos,  
4     uint256 dynamicSearchReward,  
5     uint256 tempAggregatedTargetAmount  
6   ) internal {  
7     // init all local variables as a search struct  
8     ReferrerSearch memory search;  
9     search.currentUser = pos.owner;  
10    search.firstLevelSearchUser = pos.owner;  
11    UserGlobalInfo storage userGlobalInfo = userGlobalInfos[search.currentUser];  
12    UserGlobalInfo storage referrerGlobalInfo;  
13    search.baseSalesLevel = 0;  
14    search.currentReferrer = userGlobalInfo.referrer;  
15    search.levelDiffAmount = (dynamicSearchReward * DYNAMIC_LEVEL_DIFF_RATE) / PRICE_PRECISION;  
16    search.leftLevelDiffAmount = search.levelDiffAmount;  
17    search.levelDiffAmountPerLevel = search.levelDiffAmount / 12;  
18    search.levelSearchAmount = dynamicSearchReward - search.levelDiffAmount;  
19    search.leftLevelSearchAmount = search.levelSearchAmount;  
20    search.levelSearchAmountPerReferrer = search.levelSearchAmount / 12;  
21    search.currentUserTotalPosAmount = userGlobalInfo.totalPositionAmount + pos.amount;  
22    userGlobalInfo.totalPositionAmount = search.currentUserTotalPosAmount;  
23  
24
```





APPENDIX

Auditing Approach and Methodologies applied

The Block Audit Report team has performed rigorous testing of the project including the analysis of the code design patterns where we reviewed the smart contract architecture to ensure it is structured along with the safe use of standard inherited contracts and libraries. Our team also conducted a formal line by line inspection of the Smart Contract i.e., a manual review, to find potential issues including but not limited to

- Race conditions
- Zero race conditions approval attacks
- Re-entrancy
- Transaction-ordering dependence
- Timestamp dependence
- Check-effects-interaction pattern (optimistic accounting)
- Decentralized denial-of-service attacks
- Secure ether transfer pattern
- Guard check pattern
- Fail-safe mode
- Gas-limits and infinite loops
- Call Stack depth

In the Unit testing Phase, we coded/conducted custom unit tests written against each function in the contract to verify the claimed functionality from our client. In Automated Testing, we tested the Smart Contract with our standard set of multifunctional tools to identify vulnerabilities and security flaws. The code was tested in collaboration of our multiple team members and this included but not limited to:

- Testing the functionality of the Smart Contract to determine proper logic has been followed throughout the whole process.
- Analyzing the complexity of the code in depth and in detail line-by-line manual review of the code.
- Deploying the code on testnet using multiple clients to run live tests.
- Analyzing failure preparations to check how the Smart Contract performs in case of any bugs and vulnerabilities.
- Checking whether all the libraries used in the code are on the latest version.
- Analyzing the security of the on-chain data.



Issue Categories:

Every issue in this report was assigned a severity level from the following:

Critical Severity Issues

Issues of Critical Severity leaves smart contracts vulnerable to major exploits and can lead to asset loss and data loss. These can have significant impact on the functionality/performance of the smart contract.

We recommend these issues must be fixed before proceeding to MainNet..

High Severity Issues

Issues of High Severity are not as easy to exploit but they might endanger the execution of the smart contract and potentially create crucial problems.

Fixing these issues is highly recommended before proceeding to MainNet.

Medium Severity Issues

Issues on this level are not a major cause of vulnerability to the smart contract, they cannot lead to data-manipulations or asset loss but may affect functionality.

It is important to fix these issues before proceeding to MainNet.

Low Severity Issues

Issues at this level are very low in their impact on the overall functionality and execution of the smart contract. These are mostly code-level violations or improper formatting.

These issues can be remain unfixed or can be fixed at a later date if the code is redeployed or forked.

Informational Findings

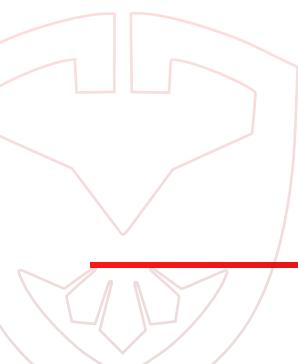
These are finding that our team comes accross when manually reviewing a smart contract which are important to know for the owners as well as users of a contract.

These issues must be acknowledged by the owners before we publish our report.

Ownership Privileges

Owner of a smart contract can include certain rights and privileges while deploying a smart contract that might be hidden deep inside the codebase and may make the project vulnerable to rug-pulls or other types of scams.

We at BlockAudit believe in transparency and hence we showcase Ownership privileges separately so the owner as well as the investors can get a better understanding about the project.



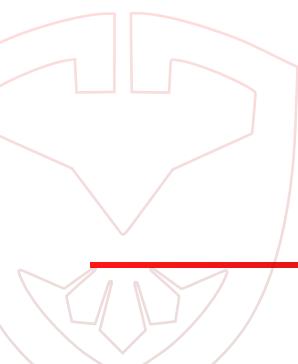


DISCLAIMER

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 the client 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 the client 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 the client to conduct the client's 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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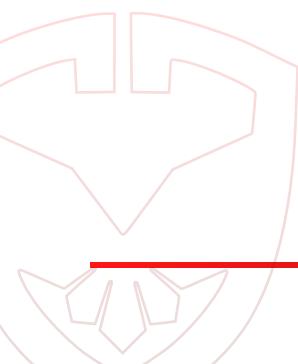




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The analysis of the security is purely based on the received smart contracts alone. No related/third-party smart contracts, applications or operations were reviewed for security. No product code has been reviewed.

Note: 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 **Avatar** team put a bug bounty program in place to encourage further analysis of the smart contracts by other third parties





About BlockAudit

BlockAudit is an industry leading security organisation that helps web3 blockchain based projects with their security and correctness of their smart-contracts. With years of experience we have a dedicated team that is capable of performing audits in a wide variety of languages including HTML, PHP, JS, Node, React, Native, Solidity, Rust and other Web3 frameworks for DApps, DeFi, GameFi and Metaverse platforms.

With a mission to make web3 a safe and secure place BlockAudit is committed to provide it's partners with a budget and investor friendly security Audit Report that will increase the value of their projects significantly.



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