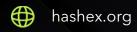
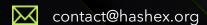


Avata AVAXStaking

smart contracts final audit report

June 2022





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1. Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice 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 disclaimer below - please make sure to read it in full.

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2. Overview

HashEx was commissioned by the Avata team to perform an audit of their smart contract. The audit was conducted between 17/06/2022 and 20/06/2022.

The purpose of this audit was to achieve the following:

- Identify potential security issues with smart contracts
- Formally check the logic behind given smart contracts.

Information in this report should be used for understanding the risk exposure of smart contracts, and as a guide to improving the security posture of smart contracts by remediating the issues that were identified.

The code is available at the GitHub repository @AVATA-Network/avata-contracts after the commit <u>6b7882c</u>.

Update: the Avata team has responded to this report.

The updated code is located in the same repository after the commit <u>2e3d11a</u>.

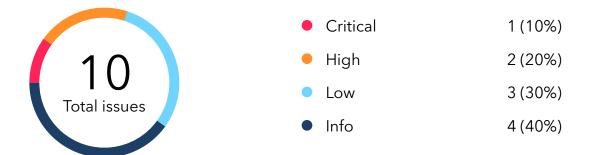
2.1 Summary

Project name	Avata AVAXStaking
URL	https://avata.network
Platform	Avalanche Network
Language	Solidity

2.2 Contracts

Name	Address
AVAXStaking	

3. Found issues



C1. AVAXStaking

ID	Severity	Title	Status
C1-01	Critical	Blocked rewards	
C1-02	High	Wrong calculations	
C1-03	High	Deposit fee isn't limited	
C1-04	Low	Gas optimizations	Partially fixed
C1-05	Low	Mass update is optional	
C1-06	Low	ACC_REWARD_PER_SHARE_PRECISION value	
C1-07	Info	Native currency transfers	
C1-08	Info	Possible reentrancy	
C1-09	Info	Inconsistent comment	
C1-10	Info	User's totalRewarded may be misleading	

4. Contracts

C1. AVAXStaking

Overview

Staking contract with fixed staking periods and WAVAX rewards.

Issues

C1-01 Blocked rewards



Every call to updatePool(uint256 _pid) for an arbitrary pid pool calculates the pool's part of reward and updates the lastRewardBalance variable. Since lastRewardBalance is shared across all the pools, part of the reward token balance would be locked forever. Assuming only 2 pools with the same allocation:

- let lastRewardBalance = 0, wavax.balanceOf(AVAXStaking) = 100
- call updatePool(0): poolInfo[0].accTokenPerShare += (100 * 1/2 *
 ACC_REWARD_PER_SHARE_PRECISION) / depositTokenSupply, lastRewardBalance = 100
- call updatePool(1): poolInfo[0].accTokenPerShare += 0

Moreover, if any user of the first pool collects their rewards, decreasing the contract's balance, then any updatePool() call would be reverted due to currentRewardBalance < lastRewardBalance.

```
function updatePool(uint256 _pid) public {
   PoolInfo storage pool = poolInfo[_pid];

   uint256 depositTokenSupply = pool.totalDeposits;
   uint256 currentRewardBalance = wavax.balanceOf(address(this));

if (depositTokenSupply == 0 || currentRewardBalance == lastRewardBalance) {
    return;
}
```

```
uint256 _accruedReward = currentRewardBalance - lastRewardBalance;

pool.accTokenPerShare = pool.accTokenPerShare + (((_accruedReward * pool.allocPoint) / totalAllocPoint) * ACC_REWARD_PER_SHARE_PRECISION) / depositTokenSupply;

lastRewardBalance = currentRewardBalance;
}
```

Recommendation

We strongly recommend redesigning the rewards calculation with additional testing.

C1-02 Wrong calculations



Typo in safeTransferReward() calculations in L439 may cause a locked WAVAX rewards.

```
function _safeTransferReward(address _to, uint256 _amount) internal {
    uint256 wavaxBalance = wavax.balanceOf(address(this));

if (_amount > wavaxBalance) {
    lastRewardBalance = lastRewardBalance - wavaxBalance;
    paidOut += wavaxBalance;

    wavax.withdraw(wavaxBalance);
    payable(_to).transfer(wavaxBalance);
} else {
    lastRewardBalance = lastRewardBalance - wavaxBalance;
    paidOut += _amount;

    wavax.withdraw(_amount);
    payable(_to).transfer(_amount);
}
```

Recommendation

Fix the typo and increase testing coverage:

```
else {
    lastRewardBalance = lastRewardBalance - _amount;
    (...)
}
```

C1-03 Deposit fee isn't limited

The owner is able to add pools with any arbitrary depositFeePercent parameter. Setting it over the DEPOSIT_FEE_PRECISION value would cause a completely malfunctioning pool. The setDepositFee() function allows the owner to update the pool deposit fee to any value up to 100%. Users must pay attention and check the deposit fee prior to the deposit act.

Recommendation

Limit the maximum fee value to significantly less than 100% and/or transfer the ownership to a Timelock-like contract.

C1-04 Gas optimizations

LowPartially fixed

High

Resolved

- a. Multiple reads from storage: user.stakesCount in L133-158, stake.id in L162, stake.amount in L182, L190, L217-228, pool.accTokenPerShare in L223-228, ACC_REWARD_PER_SHARE_PRECISION in L182-190, L223-228, lastRewardBalance in L363-364, L412-416.
- b. Excessive calculations in L190 (always zero), L228.
- c. ACC_REWARD_PER_SHARE_PRECISION should be declared constant.
- d. The initialize(), add(), deposit(), withdraw(), collect(), setAllocation(),
 userStakesCount(), getPool(), getUserStakes(), getUserStake(), getUserStakeIds(),
 deposited(), totalDeposited(), pending(), totalPending() functions can be declared as

external to save gas.

C1-05 Mass update is optional

An optional boolean flag for massUpdatePools() in add() and setAllocation() functions allows the owner to redistribute unclaimed rewards, e.g. disabling the pool's allocation. Freshly added pools receive historical rewards after the lastRewardBalance timestamp. We recommend mandatory enabling mass update with every change in allocation scheme, taking in mind possible gas limit problems in case of an extremely large poolInfo[] array.

C1-06 ACC_REWARD_PER_SHARE_PRECISION value



ACC_REWARD_PER_SHARE_PRECISION float multiplier has the immutable value of 1e36, making it plausible to overflow in rewardDebt calculations, see L151, L182, L368. The problem is prominent if pool.depositToken.decimals() is significantly less than wavax.decimals().

```
function updatePool(uint256 _pid) public {
          (...)
          pool.accTokenPerShare += _accruedReward * pool.allocPoint / totalAllocPoint *
ACC_REWARD_PER_SHARE_PRECISION / depositTokenSupply;
}
```

We recommend decreasing the multiplier value in order to support wider range of staking tokens.

C1-07 Native currency transfers

Using the transfer() method is discouraged in favor of call() with gas customization and/or reentrancy protection.

C1-08 Possible reentrancy

Info

Resolved

Reentrancy is possible in the withdraw() function if the pool.depositToken token contains transfer hooks. The owner must avoid adding pools with such tokens.

C1-09 Inconsistent comment

Info

Resolved

The comment says that depositFeePercent is limited both from below and above, but the owner is able to set any value, see Deposit fee isn't a limited issue. A minimum value check isn't implemented either.

```
uint256 depositFeePercent; // Percent of deposit fee, must be >= depositFeePrecision / 100
and less than depositFeePrecision
```

C1-10 User's totalRewarded may be misleading

Info

Resolved

In the **collect()** function, there's an update of the **user.totalRewarded** variable, but the actual transferred amount during the **safeTransferReward()** may differ from the pendingAmount:

```
function collect(uint256 _pid, uint256 _stakeId) public whenNotPaused {
    (...)
    _safeTransferReward(msg.sender, pendingAmount);
    user.totalRewarded = user.totalRewarded + pendingAmount;
    (...)
}

function _safeTransferReward(address _to, uint256 _amount) internal {
    uint256 wavaxBalance = wavax.balanceOf(address(this));
    if (_amount > wavaxBalance) {
        (...)
        payable(_to).transfer(wavaxBalance);
    } else {
        (...)
        payable(_to).transfer(_amount);
    }
}
```

}

5. Conclusion

1 critical, 2 high, and 3 medium severity issues were found, all of them were fixed with the code update.

This audit includes recommendations on code improvement and the prevention of potential attacks. We strongly suggest adding unit and functional tests with at least 80% coverage.

Appendix A. Issues' severity classification

• **Critical.** Issues that may cause an unlimited loss of funds or entirely break the contract workflow. Malicious code (including malicious modification of libraries) is also treated as a critical severity issue. These issues must be fixed before deployments or fixed in already running projects as soon as possible.

- **High.** Issues that may lead to a limited loss of funds, break interaction with users, or other contracts under specific conditions. Also, issues in a smart contract, that allow a privileged account the ability to steal or block other users' funds.
- **Medium.** Issues that do not lead to a loss of funds directly, but break the contract logic. May lead to failures in contracts operation.
- **Low.** Issues that are of a non-optimal code character, for instance, gas optimization tips, unused variables, errors in messages.
- **Informational.** Issues that do not impact the contract operation. Usually, informational severity issues are related to code best practices, e.g. style guide.

Appendix B. List of examined issue types

- Business logic overview
- Functionality checks
- Following best practices
- Access control and authorization
- Reentrancy attacks
- Front-run attacks
- DoS with (unexpected) revert
- DoS with block gas limit
- Transaction-ordering dependence
- ERC/BEP and other standards violation
- Unchecked math
- Implicit visibility levels
- Excessive gas usage
- Timestamp dependence
- Forcibly sending ether to a contract
- Weak sources of randomness
- Shadowing state variables
- Usage of deprecated code

- contact@hashex.org
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