



METATRUST

Security Assessment for  
**Accumulated Finance**

June 29, 2024

## Executive Summary

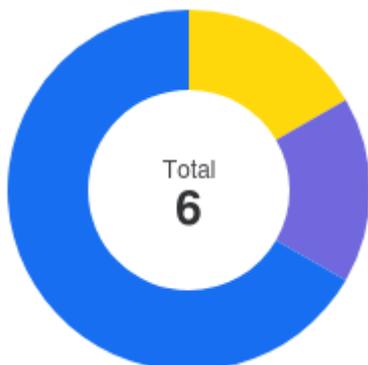
Overview	
Project Name	Accumulated Finance
Codebase URL	https://github.com/AccumulatedFinance/contracts-v2
Scan Engine	Security Analyzer
Scan Time	2024/06/29 08:00:00
Commit Id	41ef980cc65a81b256ed7616e4f26d33597e72a8

Total	
Critical Issues	0
High risk Issues	0
Medium risk Issues	1
Low risk Issues	1
Informational Issues	4

Critical Issues	<p>The issue can cause large economic losses, large-scale data disorder, loss of control of authority management, failure of key functions, or indirectly affect the correct operation of other smart contracts interacting with it.</p> 
High Risk Issues	<p>The issue puts a large number of users' sensitive information at risk or is reasonably likely to lead to catastrophic impacts on clients' reputations or serious financial implications for clients and users.</p> 
Medium Risk Issues	<p>The issue puts a subset of users' sensitive information at risk, would be detrimental to the client's reputation if exploited, or is reasonably likely to lead to moderate financial impact.</p> 
Low Risk Issues	<p>The risk is relatively small and could not be exploited on a recurring basis, or is a risk that the client has indicated is low-impact in view of the client's business circumstances.</p> 
Informational Issue	<p>The issue does not pose an immediate risk but is relevant to security best practices or Defence in Depth.</p> 



	Critical Issues	0%	0
	High risk Issues	0%	0
	Medium risk Issues	17%	1
	Low risk Issues	17%	1
	Informational Issues	67%	4

## Summary of Findings

MetaScan security assessment was performed on **June 29, 2024 08:00:00** on project **Accumulated Finance** with the repository on branch **default branch**. The assessment was carried out by scanning the project's codebase using the scan engine **Security Analyzer**. There are in total **6** vulnerabilities / security risks discovered during the scanning session, among which **1** medium risk vulnerabilities, **1** low risk vulnerabilities, **4** informational issues.

Besides the audited contract ``Minter``, there are following two contracts in the Accumulatd Finance:

The ``stToken`` contract, it is an ERC20 token contract, and its owner has the privilege of the following functions:

- ``pause``: Allows the owner to pause all token transfers;
- ``unpause``: Allows the owner to unpause all token transfers;
- ``mint``: Allows the owner to mint new tokens to a specified address.

The ``wstToken`` contract, it is a fork of the audited and deployed [sfrxETH](#) with the below little update:

- renamed sfrxETH to wstToken
- removed the ``andSync`` modifier from functions, ``deposit``, ``mint``, ``withdraw``, and ``redeem``.
- the ``syncRewards`` function reverts if the ``nextRewards`` is zero.

ID	Description	Severity	Alleviation
MSA-001	Centralization Risk	Medium risk	Acknowledged
MSA-002	The <code>minWithdrawal</code> lacks the upper boundry	Low risk	Fixed
MSA-003	Unused Return Value	Informational	Fixed
MSA-004	SafeMath Can be Remove on the Solidity Version 0.8.0 or Above 0.8.0	Informational	Fixed
MSA-005	The Redundant Check on <code>request.claimed</code> From the <code>processWithdrawals</code> Function	Informational	Fixed
MSA-006	No Need to Use <code>safeTransferFrom</code>	Informational	Fixed

## Findings

### Medium risk (1)

#### 1. Centralization Risk

 Medium risk Security Analyzer

In the **BaseMinter** contract, the owner has the privilege of the following functions:

- **updateDepositFee**: Allows the owner to update the deposit fee up to a maximum of 5%;
- **transferStakingTokenOwnership**: Allows the owner to transfer the ownership of the staking token to a new owner;
- **mint**: Allows the owner to mint new staking tokens to a specified address.

In the **NativeMinter** contract, the owner has the privilege of the following functions:

- **withdraw**: Allows the owner to withdraw all the network coin balance from the contract to a specified address.

In the **ERC20Minter** contract, the owner has the privilege of the following functions:

- **withdraw**: Allows the owner to withdraw all the base token balance from the contract to a specified address.

In the **BaseMinterRedeem** contract, the owner has the privilege of the following functions:

- **updateRedeemFee**: Allows the owner to update the redeem fee up to a maximum of 5%.

In the **BaseMinterWithdrawal** contract, the owner has the privilege of the following functions:

- **updateWithdrawalFee**: Allows the owner to update the withdrawal fee up to a maximum of 5%;
- **updateMinWithdrawal**: Allows the owner to update the minimum withdrawal amount;
- **processWithdrawals**: Allows the owner to process multiple withdrawal requests;
- **collectWithdrawalFees**: Allows the owner to collect accumulated withdrawal fees from the contract.

In the **NativeMinterWithdrawal** contract, the owner has the privilege of the following functions:

- **withdraw**: Allows the owner to withdraw the available network coin balance from the contract to a specified address.

In the **ERC20MinterWithdrawal** contract, the owner has the privilege of the following functions:

- **withdraw**: Allows the owner to withdraw the available base token balance from the contract to a specified address.

#### File(s) Affected

Minter.sol #1949-1953

```
1949     function updateRedeemFee(uint256 newFee) public onlyOwner {
1950         require(newFee <= MAX_REDEEM_FEE, ">MaxFee");
1951         redeemFee = newFee;
1952         emit UpdateRedeemFee(newFee);
1953     }
```

## Minter.sol #2065-2075

```
2065     function updateWithdrawalFee(uint256 newFee) public onlyOwner {
2066         require(newFee <= MAX_WITHDRAWAL_FEE, ">MaxFee");
2067         withdrawalFee = newFee;
2068         emit UpdateWithdrawalFee(withdrawalFee);
2069     }
2070
2071     function updateMinWithdrawal(uint256 newMin) public onlyOwner {
2072         require(newMin > 0, "ZeroMinWithdrawal");
2073         minWithdrawal = newMin;
2074         emit UpdateMinWithdrawal(minWithdrawal);
2075     }
```

## Minter.sol #2114-2114

```
2114     function processWithdrawals(uint256[] calldata withdrawalIds) public onlyOwner {
```

## Minter.sol #2134-2134

```
2134     function collectWithdrawalFees(address receiver) public onlyOwner {
```

## Minter.sol #2167-2167

```
2167     function withdraw(address receiver) public virtual onlyOwner override {
```

## Minter.sol #2213-2213

```
2213     function withdraw(address receiver) public virtual onlyOwner override {
```

## Minter.sol #1859-1867

```
1859     function transferStakingTokenOwnership(address newOwner) public onlyOwner {///@audit CR @audit two
1860         stakingToken.transferOwnership(newOwner);
1861         emit TransferStakingTokenOwnership(newOwner);
1862     }
1863
1864     function mint(uint256 amount, address receiver) public onlyOwner {
1865         stakingToken.mint(receiver, amount);
1866         emit Mint(address(msg.sender), receiver, amount);
1867     }
```

## Minter.sol #1888-1893

```
1888     function withdraw(address receiver) public virtual onlyOwner {
1889         uint256 availableBalance = address(this).balance;
1890         require(availableBalance > 0, "ZeroWithdraw");
1891         SafeTransferLib.safeTransferETH(receiver, availableBalance);
1892         emit Withdraw(address(msg.sender), receiver, availableBalance);
1893     }
```

## Minter.sol #1923-1928

```
1923     function withdraw(address receiver) public virtual onlyOwner {
1924         uint256 availableBalance = baseToken.balanceOf(address(this));
1925         require(availableBalance > 0, "ZeroWithdraw");
1926         baseToken.safeTransferFrom(address(this), receiver, availableBalance);
1927         emit Withdraw(address(msg.sender), receiver, availableBalance);
1928     }
```

### Recommendation

Consider implementing a decentralized governance mechanism or a multi-signature scheme that requires consensus among multiple parties before pausing or unpausing the contract. This can help mitigate the centralization risk associated with a single owner controlling critical contract functions. Alternatively, you can provide a clear justification for the centralization aspect and ensure that users are aware of the potential risks associated with a single point of control.

### Alleviation Acknowledged

The Accumulated Finance replied as below:

In standard design tokens for staking are withdrawn by multi-sig admin and staked using Accumulated Finance Staking Manager automated system that prevents human errors.

If the network provides a permissionless way to stake tokens on behalf of the smart contract, withdrawal by multi-sig admin can be disabled in the contract and additional methods to manage stake on behalf of Minter contract can be implemented.

In standard design LST rewards are minted by multi-sig admin. With the release of AEVM (Accumulated EVM), we plan to mitigate this centralization risk by validating staking rewards, issuing LST rewards, and processing withdrawals through a set of network validators.

## Low risk (1)

### 1. The `minWithdrawal` lacks the upper boundry

 Low risk

 Security Analyzer

The `minWithdrawal` lacks the upper boundry, as a result, if it is set as the max value of the type `uint256`, the `requestWithdrawal` function will malfunction, due to the `require` check will always fail.

```
function requestWithdrawal(uint256 amount, address receiver) public nonReentrant {
    require(amount >= minWithdrawal, "LessThanMin");
}
```

#### File(s) Affected

Minter.sol #2071-2075

```
2071     function updateMinWithdrawal(uint256 newMin) public onlyOwner {
2072         require(newMin > 0, "ZeroMinWithdrawal");
2073         minWithdrawal = newMin;
2074         emit UpdateMinWithdrawal(minWithdrawal);
2075     }
```

#### Recommendation

Adding upper boundry for the `minWithdrawal`.

#### Alleviation Fixed

This finding is addressed by adding a upper boundry, in commit `03e161dd28c036505e16902904e7d4ef627b45c3`.

## Informational (4)

### 1. Unused Return Value

 Informational

 Security Analyzer

Either the return value of an external call is not stored in a local or state variable, or the return value is declared but never used in the function body.

#### File(s) Affected

Minter.sol #1908-1908

```
1908     baseToken.approve(address(this), type(uint256).max);
```

Minter.sol #2136-2136

```
2136         stakingToken.approve(address(this), totalWithdrawalFees);
```

**Recommendation**

Ensure the return value of external function calls is used.

**Alleviation** Fixed

The finding is addressed by removing the functions, in commits `afc847b6bb695ded7e93806c7e6bb6cab0ad72c9`, and `fd16775131dabe48fb1bbd68785c6ecaee31ba1a`.

## 2. SafeMath Can be Remove on the Solidity Version 0.8.0 or Above 0.8.0

 Informational Security Analyzer

Solidity version is 0.8.0 or above 0.8.0 implemented the overflow checks same as the SafeMath did.

Reference: [Arithmetic operations revert on underflow and overflow](#)

**File(s) Affected**

Minter.sol #2-2

```
2 pragma solidity ^0.8.20;
```

**Recommendation**

Removing the usage of the SafeMath library.

**Alleviation** Fixed

This finding is addressed by removing the usage of the SafeMath, in the commit `311ba2576115d64a6b55543204ff99ccf6909d47`.

## 3. The Redundant Check on `request.claimed` From the `processWithdrawals` Function

 Informational Security Analyzer

The `processWithdrawals` function will move a withdrawal request's status `processed` from `false` to `true`, and each withdrawal request can only be processed once due to there is a `require` check on the `request.processed`:

```
function processWithdrawals(uint256[] calldata withdrawalIds) public onlyOwner {
    uint256 totalWithdrawals;
    for (uint256 i = 0; i < withdrawalIds.length; i++) {
        uint256 withdrawalId = withdrawalIds[i];
        WithdrawalRequest storage request = _withdrawalRequests[withdrawalId];
        require(request.amount > 0, "ZeroAmount");
        require(!request.processed, "AlreadyProcessed");
        require(!request.claimed, "AlreadyClaimed");//@audit redundant check
```

Meanwhile, the `request.claimed` status does not be updated in the `processWithdrawals` function. there is no need to check the `request.claimed` status from the `processWithdrawals` function.

**File(s) Affected**

Minter.sol #2121-2121

```
2121         require(!request.claimed, "AlreadyClaimed");
```

### Recommendation

Removing the redundant check on the `request.claimed` status.

### Alleviation Fixed

This finding is addressed by removing the redundant check, in the commit 9fae5f3ad8dacee6a6b9c114d26ce512972f71a5.

## 4. No Need to Use `safeTransferFrom`

 Informational

 Security Analyzer

When deploying the `ERC20Minter` contract, the contract first approves itself a max allowance for the token `baseToken`, in order to call the `safeTransferFrom` function with enough allowance from the `deposit` function and the `withdraw` function.

```
constructor(address _baseToken, address _stakingToken) BaseMinter(_stakingToken) {
    baseToken = IERC20(_baseToken);
    // this contract can spend baseToken
    baseToken.approve(address(this), type(uint256).max);
}
...
function withdraw(address receiver) public virtual onlyOwner {
    uint256 availableBalance = baseToken.balanceOf(address(this));
    require(availableBalance > 0, "ZeroWithdraw");
    baseToken.safeTransferFrom(address(this), receiver, availableBalance);
    emit Withdraw(address(msg.sender), receiver, availableBalance);
}
```

However, there is no need to do the `approve + safeTransferFrom` actions if the from address in the `safeTransferFrom` function is the contract itself, it can be totally replace them with one `safeTransfer` function.

The similar case happens on the below functions:

- The `redeem` function of the `ERC20MinterRedeem` contract.
- The `collectWithdrawalFees` function of the `BaseMinterWithdrawal` contract.
- Functions `withdraw`, and `claimWithdrawal` of the `ERC20MinterWithdrawal` contract.

### File(s) Affected

Minter.sol #1908-1908

```
1908     baseToken.approve(address(this), type(uint256).max);
```

Minter.sol #1918-1918

```
1918     baseToken.safeTransferFrom(address(msg.sender), address(this), amount);
```

Minter.sol #1926-1926

```
1926     baseToken.safeTransferFrom(address(this), receiver, availableBalance);
```

Minter.sol #2134-2140

```
2134     function collectWithdrawalFees(address receiver) public onlyOwner {
2135         require(totalWithdrawalFees > 0, "ZeroFees");
2136         stakingToken.approve(address(this), totalWithdrawalFees);
2137         stakingToken.safeTransferFrom(address(this), receiver, totalWithdrawalFees);
2138         totalWithdrawalFees = 0;
2139         emit CollectWithdrawalFees(address(msg.sender), receiver, totalWithdrawalFees);
2140     }
```

Minter.sol #2228-2228

```
2228         baseToken.safeTransferFrom(address(this), receiver, request.amount);
```

Minter.sol #1991-1991

```
1991         baseToken.safeTransferFrom(address(this), receiver, redeemAmount);
```

Minter.sol #2216-2216

```
2216         baseToken.safeTransferFrom(address(this), receiver, balance);
```

### Recommendation

Replacing the `approve + safeTransferFrom` actions with the `safeTransfer` when the from address in the `safeTransferFrom` function is the contract itself.

### Alleviation Fixed

This finding is addressed by replacing the `approve + safeTransferFrom` actions with the `safeTransfer`, in commits `fd16775131dabe48fb1bbd68785c6ecaee31ba1a` and `afc847b6bb695ded7e93806c7e6bb6cab0ad72c9`.

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