HALBORN

BASE PROTOCOL

Smart Contract Security Audit

Prepared by: **Halborn**
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Visit: **Halborn.com**

DOCUMENT REVISION HISTORY

VERSION	MODIFICATION	DATE	AUTHOR
0.1	Document Creation	10/12/2020	Gabi Urrutia
0.2	Document Edits	10/12/2020	Steven Walbroehl
1.0	Draft Version	10/30/2020	Steven Walbroehl

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1.1 INTRODUCTION

Base Protocol engaged Halborn to conduct a security assessment on their all smart contracts that implement the protocol on the Ethereum blockchain. Base Protocol is a decentralized elastic supply protocol for creating indices of other tokens. It maintains a price peg by adjusting supply directly to and from wallet holders based on a data feed generated by off-chain oracles. The security assessment was scoped to the contract BaseToken, BaseTokenMonetaryPolicy, BaseTokenOrchestrator, ERC20UpgradeSafe, ERC677Token, Greeter and an audit of the security risk and implications regarding the changes introduced by the development team at Base Protocol prior to its production release shortly following the assessments deadline.

Overall, the smart contract code is extremely well documented, follows a high-quality software development standard, contains many utilities and automation scripts to support continuous deployment / testing / integration, and does NOT contain any obvious exploitation vectors that Halborn was able to leverage within the timeframe of testing allotted.

Though the outcome of this security audit is satisfactory; due to time and resource constraints, only testing and verification of essential properties were performed to achieve objectives and deliverables set in the scope. It is important to remark the use of the best practices for secure smart contract development. Halborn recommends performing further testing to validate extended safety and correctness in context to the whole set of contracts. External threats, such as economic attacks, oracle attacks, and inter-contract functions and calls should be validated for expected logic and state.

1.2 TEST APPROACH & METHODOLOGY

Halborn performed a combination of manual and automated security testing to balance efficiency, timeliness, practicality, and accuracy in regard to the scope of the smart contract audit. While manual testing is recommended to uncover flaws in logic, process, and implementation; automated testing techniques help enhance coverage of smart contracts and can quickly identify items that do not follow security best practices. The following phases and associated tools were used throughout the term of the audit:

- Research into architecture and purpose
- Smart Contract manual code read and walkthrough

- Graphing out functionality and contract logic/connectivity/functions (solgraph)
- Manual Assessment of use and safety for the critical solidity variables and functions in scope to identify any arithmetic related vulnerability classes.
- Scanning of solidity files for vulnerabilities, security hotspots, or bugs. (MythX)
- Static Analysis of security for scoped contract, and imported functions. (Slither)
- Testnet deployment (Truffle, Ganache, Infura)
- Smart Contract Fuzzing and dynamic state exploitation (Echidna) Symbolic Execution / EVM bytecode security assessment (limited time)

1.3 SCOPE

Code related to:

- BaseToken.sol
- BaseTokenMonetaryPolicy.sol
- BaseTokenOrchestrastor.sol
- ERC20UpgradeSafe.sol
- ERC677Token.sol
- Greeter.sol

Specific commit of contract: Commit ID:

cbbf4d8e1970e72df80b461358552c431296c6a2

OUT-OF-SCOPE:

External contracts, External Oracles, other smart contracts in the repository or imported by BASE protocol contracts, economic attacks

2. ASSESSMENT SUMMARY & FINDINGS OVERVIEW

CRITICAL	HIGH	MEDIUM	LOW
0	0	1	3

SECURITY ANALYSIS	RISK LEVEL
USE OF TX.ORIGIN	Medium
AVOID USING NOW	Low
BALANCE VALIDATION IS MISSING	Low
STATE VARIABLE SHADOWING	Informational
STATIC ANALYSIS	Low

FINDINGS & TECH DETAILS

3.1 USE OF TX.ORIGIN – MEDIUM

Description

"tx.origin" is useful only in very exceptional cases. If it is use for authentication, then it makes no impact, because any contract you call can act on your behalf. So it is recommended to Never use tx.origin for authorization.

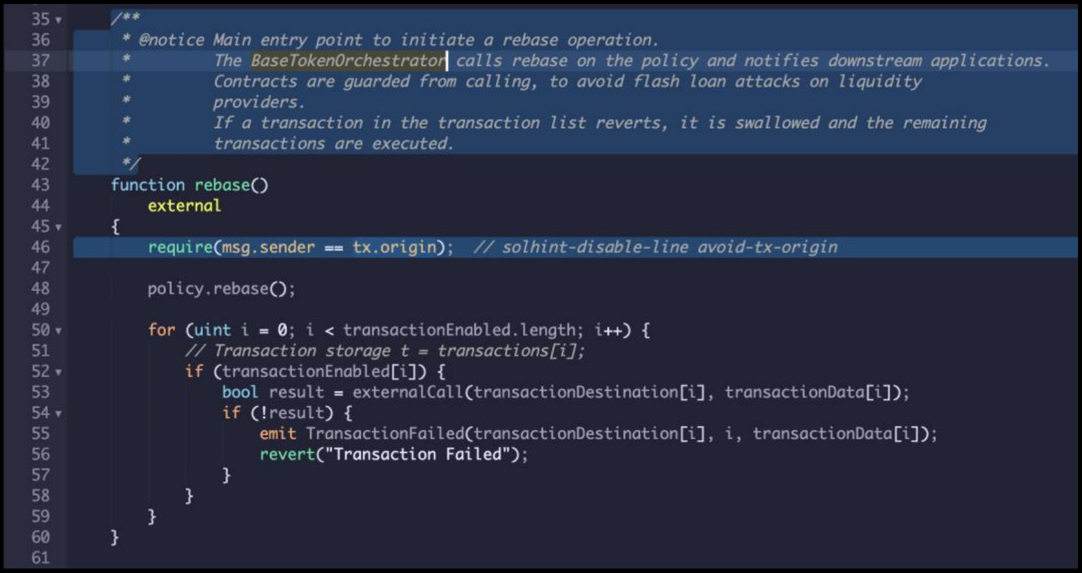
Here in rebase() function of BaseTokenOrchestrator.sol contract which is callable from external has this require() condition which should be fix to filter out non required address to call this method.

Reference:

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseTokenOrchestrator.sol#L46

Code Location

BaseTokenOrchestrator.sol



```
    /**
     * @notice Main entry point to initiate a rebase operation.
     *         The BaseTokenOrchestrator calls rebase on the policy and notifies downstream applications.
     *         Contracts are guarded from calling, to avoid flash loan attacks on liquidity
     *         providers.
     *         If a transaction in the transaction list reverts, it is swallowed and the remaining
     *         transactions are executed.
     */
    function rebase()
        external
    {
        require(msg.sender == tx.origin);  // solhint-disable-line avoid-tx-origin

        policy.rebase();

        for (uint i = 0; i < transactionEnabled.length; i++) {
            // Transaction storage t = transactions[i];
            if (transactionEnabled[i]) {
                bool result = externalCall(transactionDestination[i], transactionData[i]);
                if (!result) {
                    emit TransactionFailed(transactionDestination[i], i, transactionData[i]);
                    revert("Transaction Failed");
                }
            }
        }
    }
```

3.2. AVOID USING NOW - LOW

Description:

“now” can be influenced by miners to some degree. Miners can manipulates “now” to exploit the contract. Here in BaseTokenMonetaryPolicy.sol contract, “now” is being used in inRebaseWindow() and rebase() methods.

Recommendation:

Avoid getting relied on use of “now” in require methods.

Code Location:

BaseTokenMonetaryPolicy.sol

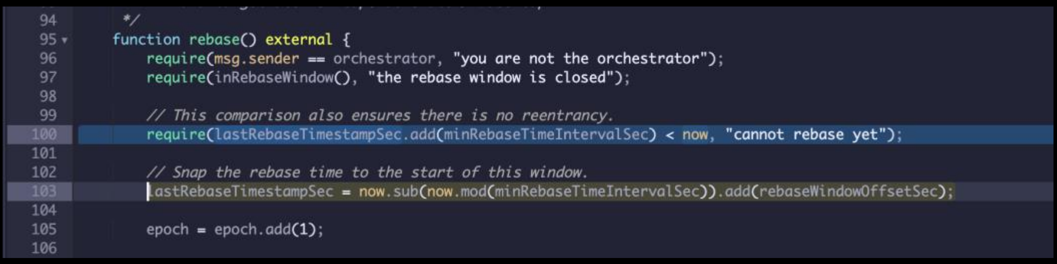
https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseTokenMonetaryPolicy.sol#L100)

BaseTokenMonetaryPolicy.sol

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseTokenMonetaryPolicy.sol#L103

BaseTokenMonetaryPolicy.sol

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseTokenMonetaryPolicy.sol#L134



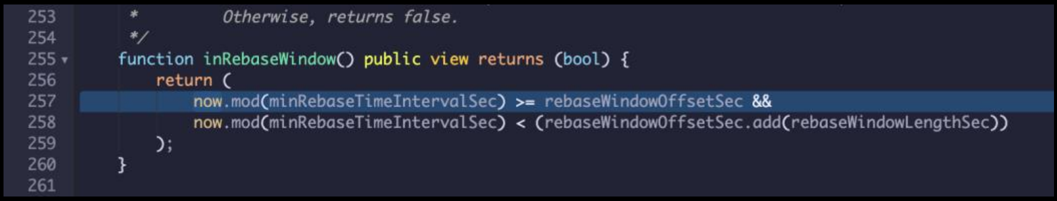
```
 94      */
 95     function rebase() external {
 96         require(msg.sender == orchestrator, "you are not the orchestrator");
 97         require(inRebaseWindow(), "the rebase window is closed");
 98 
 99         // This comparison also ensures there is no reentrancy.
100         require(lastRebaseTimestampSec.add(minRebaseTimeIntervalSec) < now, "cannot rebase yet");
101 
102         // Snap the rebase time to the start of this window.
103         lastRebaseTimestampSec = now.sub(now.mod(minRebaseTimeIntervalSec)).add(rebaseWindowOffsetSec);
104 
105         epoch = epoch.add(1);
106 
```

BaseTokenMonetaryPolicy.sol

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseTokenMonetaryPolicy.sol#L257

BaseTokenMonetaryPolicy.sol

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseTokenMonetaryPolicy.sol#L258



```
     *          Otherwise, returns false.
     */
    function inRebaseWindow() public view returns (bool) {
        return (
            now.mod(minRebaseTimeIntervalSec) >= rebaseWindowOffsetSec &&
            now.mod(minRebaseTimeIntervalSec) < (rebaseWindowOffsetSec.add(rebaseWindowLengthSec))
        );
    }
```

3.3 BALANCE VALIDATION IS MISSING - LOW

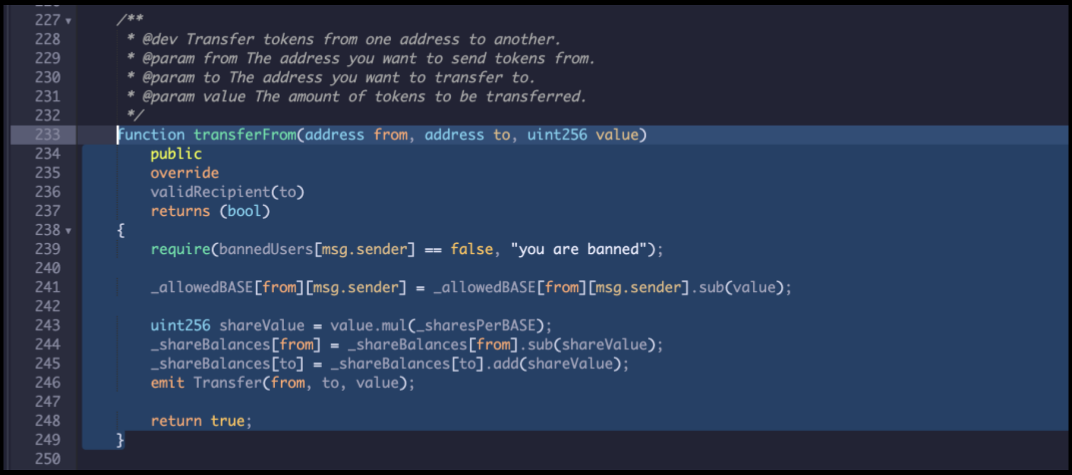
Description:

In transferFrom() method of BaseToken.sol, before subtracting the amount from the _shareBalances[], check is missing whether the sufficient amount is there in or not. It will result into integer overflow issue.

Location:

BaseToken.sol

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseToken.sol#L233



```
    /**
     * @dev Transfer tokens from one address to another.
     * @param from The address you want to send tokens from.
     * @param to The address you want to transfer to.
     * @param value The amount of tokens to be transferred.
     */
    function transferFrom(address from, address to, uint256 value)
        public
        override
        validRecipient(to)
        returns (bool)
    {
        require(bannedUsers[msg.sender] == false, "you are banned");

        _allowedBASE[from][msg.sender] = _allowedBASE[from][msg.sender].sub(value);

        uint256 shareValue = value.mul(_sharesPerBASE);
        _shareBalances[from] = _shareBalances[from].sub(shareValue);
        _shareBalances[to] = _shareBalances[to].add(shareValue);
        emit Transfer(from, to, value);

        return true;
    }
```

Here, before subtracting the amount from _shareBalances of that address, the sufficient amount check is required.

3.4 STATE VARIABLE SHADOWING - INFORMATIONAL

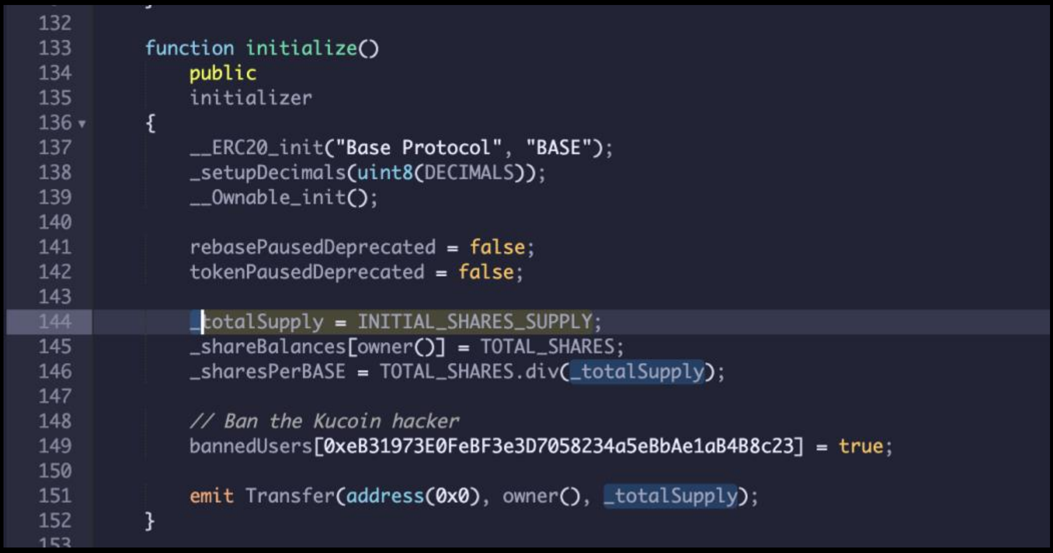
Description:

There are few state variables are getting shadowed by the child contract BaseToken.sol (_totalSupply variable) and ERC20UpgradeSafe.sol (__gap variable).

Location:

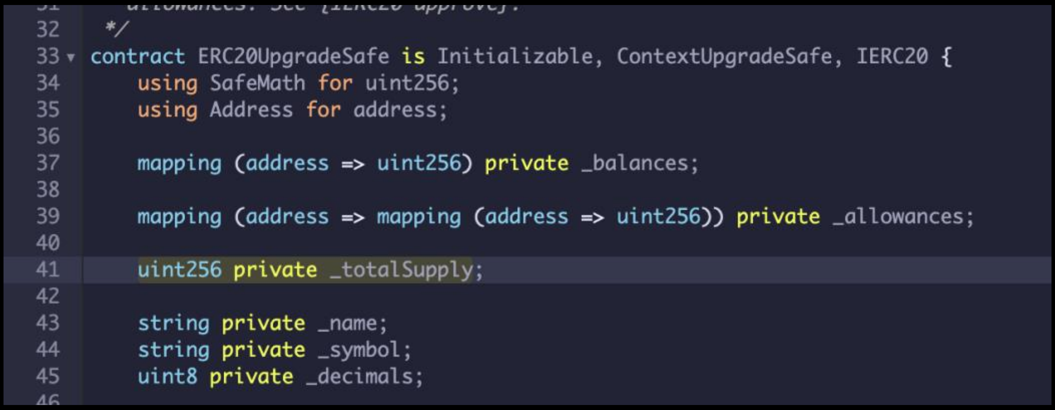
_totalSupply variable from BaseToken.sol is shadowing _totalSupply variable of ERC20UpgradeSafe.sol

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/BaseToken.sol#L144



```
    function initialize()
        public
        initializer
    {
        __ERC20_init("Base Protocol", "BASE");
        _setupDecimals(uint8(DECIMALS));
        __Ownable_init();

        rebasePausedDeprecated = false;
        tokenPausedDeprecated = false;

        _totalSupply = INITIAL_SHARES_SUPPLY;
        _shareBalances[owner()] = TOTAL_SHARES;
        _sharesPerBASE = TOTAL_SHARES.div(_totalSupply);

        // Ban the Kucoin hacker
        bannedUsers[0xeB31973E0FeBF3e3D7058234a5eBbAe1aB4B8c23] = true;

        emit Transfer(address(0x0), owner(), _totalSupply);
    }
```

1 BaseToken.sol

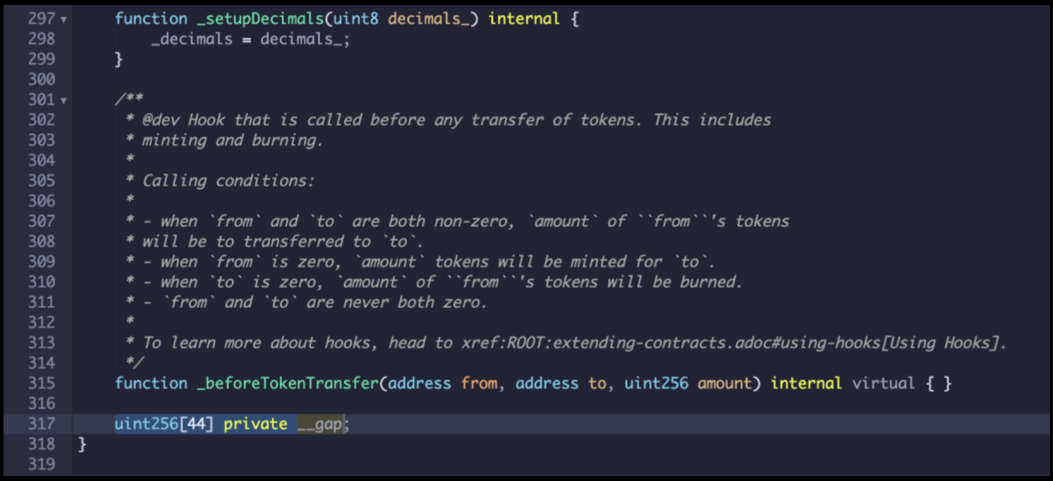


```
 */
contract ERC20UpgradeSafe is Initializable, ContextUpgradeSafe, IERC20 {
    using SafeMath for uint256;
    using Address for address;

    mapping (address => uint256) private _balances;

    mapping (address => mapping (address => uint256)) private _allowances;

    uint256 private _totalSupply;

    string private _name;
    string private _symbol;
    uint8 private _decimals;
```

1 ERC20UpgradeSafe.sol

__gap variable from ERC20UpgradeSafe.sol is shadowing __gap variable of ContextUpgradeSafe.sol

https://github.com/Base-Protocol/contracts-0.6.12/blob/cbbf4d8e1970e72df80b461358552c431296c6a2/contracts/ERC20UpgradeSafe.sol#L317

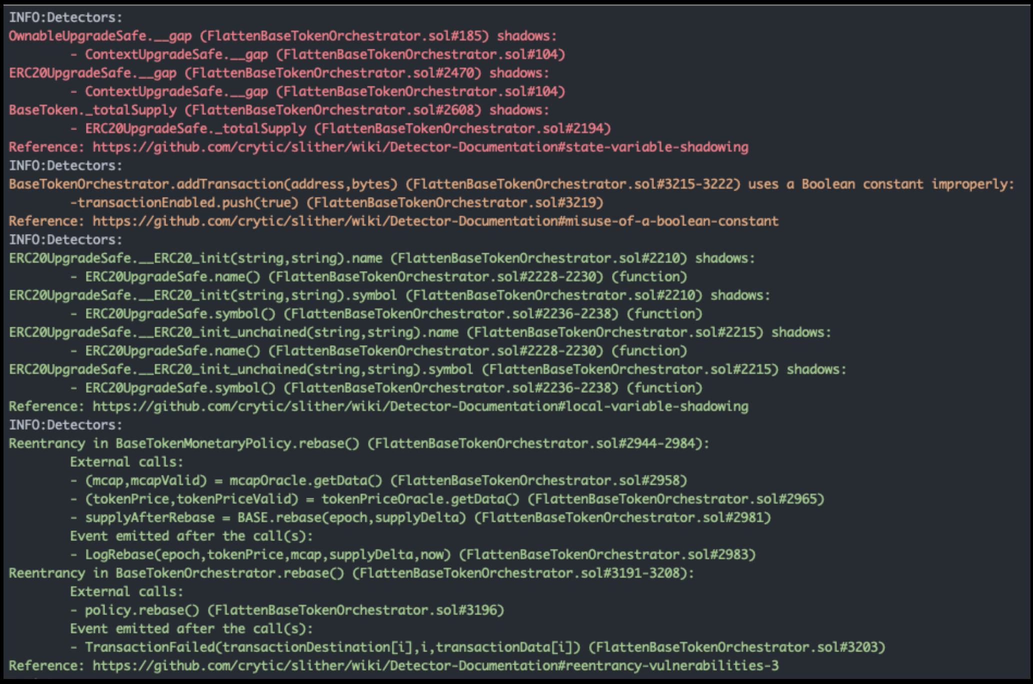


```
    function _setupDecimals(uint8 decimals_) internal {
        _decimals = decimals_;
    }

    /**
     * @dev Hook that is called before any transfer of tokens. This includes
     * minting and burning.
     *
     * Calling conditions:
     *
     * - when `from` and `to` are both non-zero, `amount` of ``from``'s tokens
     * will be to transferred to `to`.
     * - when `from` is zero, `amount` tokens will be minted for `to`.
     * - when `to` is zero, `amount` of ``from``'s tokens will be burned.
     * - `from` and `to` are never both zero.
     *
     * To learn more about hooks, head to xref:ROOT:extending-contracts.adoc#using-hooks[Using Hooks].
     */
    function _beforeTokenTransfer(address from, address to, uint256 amount) internal virtual { }

    uint256[44] private __gap;
}
```

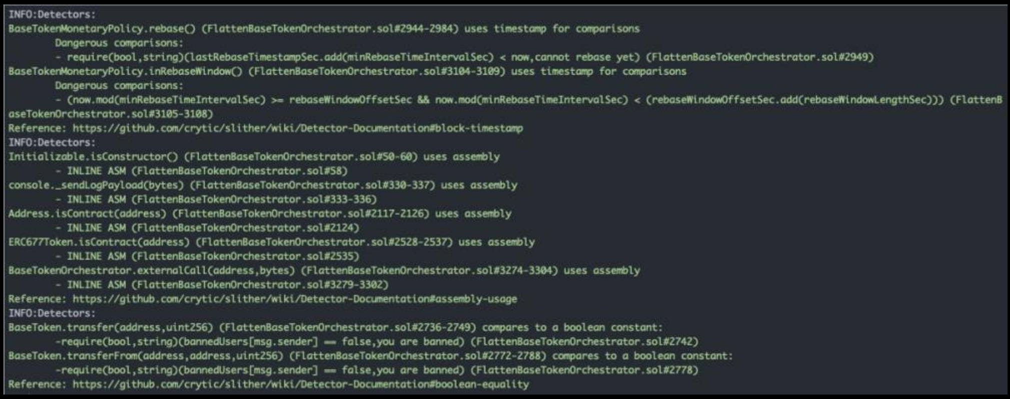
3 ERC20UpgradeSafe.sol

3.5 STATIC ANALYSIS - LOW

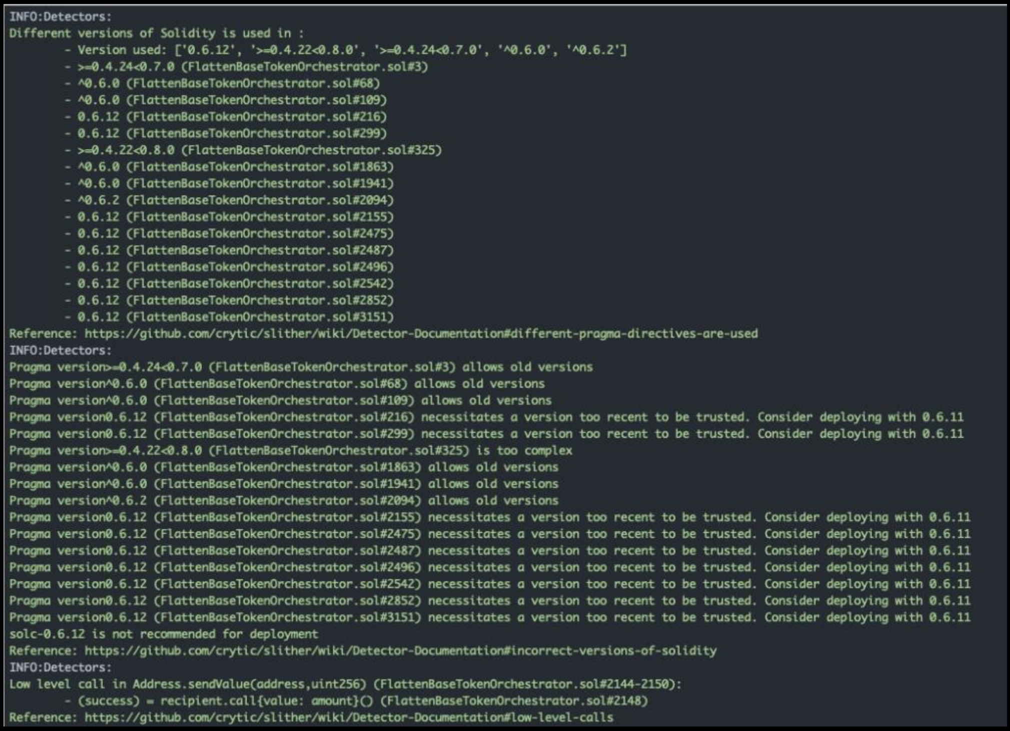
Slither and MythX has been run on all the contracts (BaseToken.sol, BaseTokenMonetaryPolicy.sol, BaseTokenOrchestrator.sol, ERC20UpgradeSafe.sol, ERC677Token.sol and Greeter.sol)



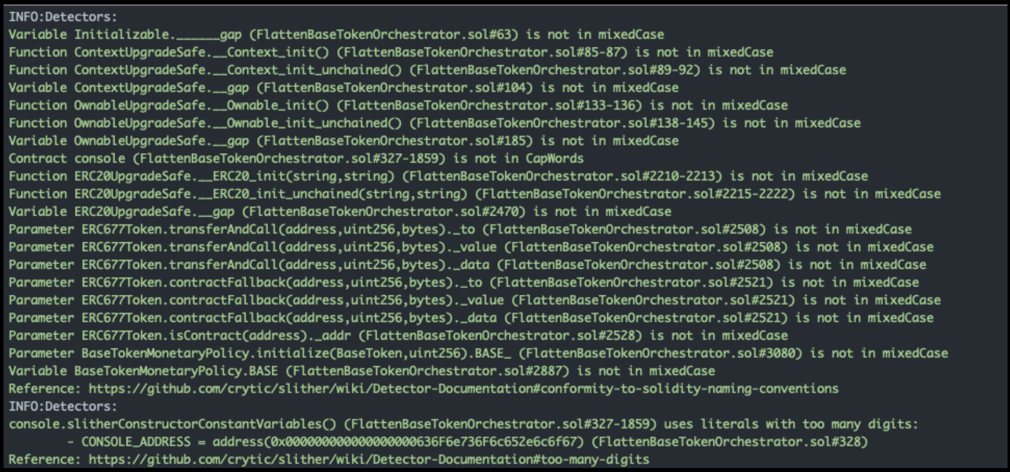
```
INFO:Detectors:
OwnableUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#185) shadows:
        - ContextUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#104)
ERC20UpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#2470) shadows:
        - ContextUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#104)
BaseToken._totalSupply (FlattenBaseTokenOrchestrator.sol#2608) shadows:
        - ERC20UpgradeSafe._totalSupply (FlattenBaseTokenOrchestrator.sol#2194)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variable-shadowing
INFO:Detectors:
BaseTokenOrchestrator.addTransaction(address,bytes) (FlattenBaseTokenOrchestrator.sol#3215-3222) uses a Boolean constant improperly:
        -transactionEnabled.push(true) (FlattenBaseTokenOrchestrator.sol#3219)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#misuse-of-a-boolean-constant
INFO:Detectors:
ERC20UpgradeSafe.__ERC20_init(string,string).name (FlattenBaseTokenOrchestrator.sol#2210) shadows:
        - ERC20UpgradeSafe.name() (FlattenBaseTokenOrchestrator.sol#2228-2230) (function)
ERC20UpgradeSafe.__ERC20_init(string,string).symbol (FlattenBaseTokenOrchestrator.sol#2210) shadows:
        - ERC20UpgradeSafe.symbol() (FlattenBaseTokenOrchestrator.sol#2236-2238) (function)
ERC20UpgradeSafe.__ERC20_init_unchained(string,string).name (FlattenBaseTokenOrchestrator.sol#2215) shadows:
        - ERC20UpgradeSafe.name() (FlattenBaseTokenOrchestrator.sol#2228-2230) (function)
ERC20UpgradeSafe.__ERC20_init_unchained(string,string).symbol (FlattenBaseTokenOrchestrator.sol#2215) shadows:
        - ERC20UpgradeSafe.symbol() (FlattenBaseTokenOrchestrator.sol#2236-2238) (function)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#local-variable-shadowing
INFO:Detectors:
Reentrancy in BaseTokenMonetaryPolicy.rebase() (FlattenBaseTokenOrchestrator.sol#2944-2984):
        External calls:
        - (mcap,mcapValid) = mcapOracle.getData() (FlattenBaseTokenOrchestrator.sol#2958)
        - (tokenPrice,tokenPriceValid) = tokenPriceOracle.getData() (FlattenBaseTokenOrchestrator.sol#2965)
        - supplyAfterRebase = BASE.rebase(epoch,supplyDelta) (FlattenBaseTokenOrchestrator.sol#2981)
        Event emitted after the call(s):
        - LogRebase(epoch,tokenPrice,mcap,supplyDelta,now) (FlattenBaseTokenOrchestrator.sol#2983)
Reentrancy in BaseTokenOrchestrator.rebase() (FlattenBaseTokenOrchestrator.sol#3191-3208):
        External calls:
        - policy.rebase() (FlattenBaseTokenOrchestrator.sol#3196)
        Event emitted after the call(s):
        - TransactionFailed(transactionDestination[i],i,transactionData[i]) (FlattenBaseTokenOrchestrator.sol#3203)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3
```



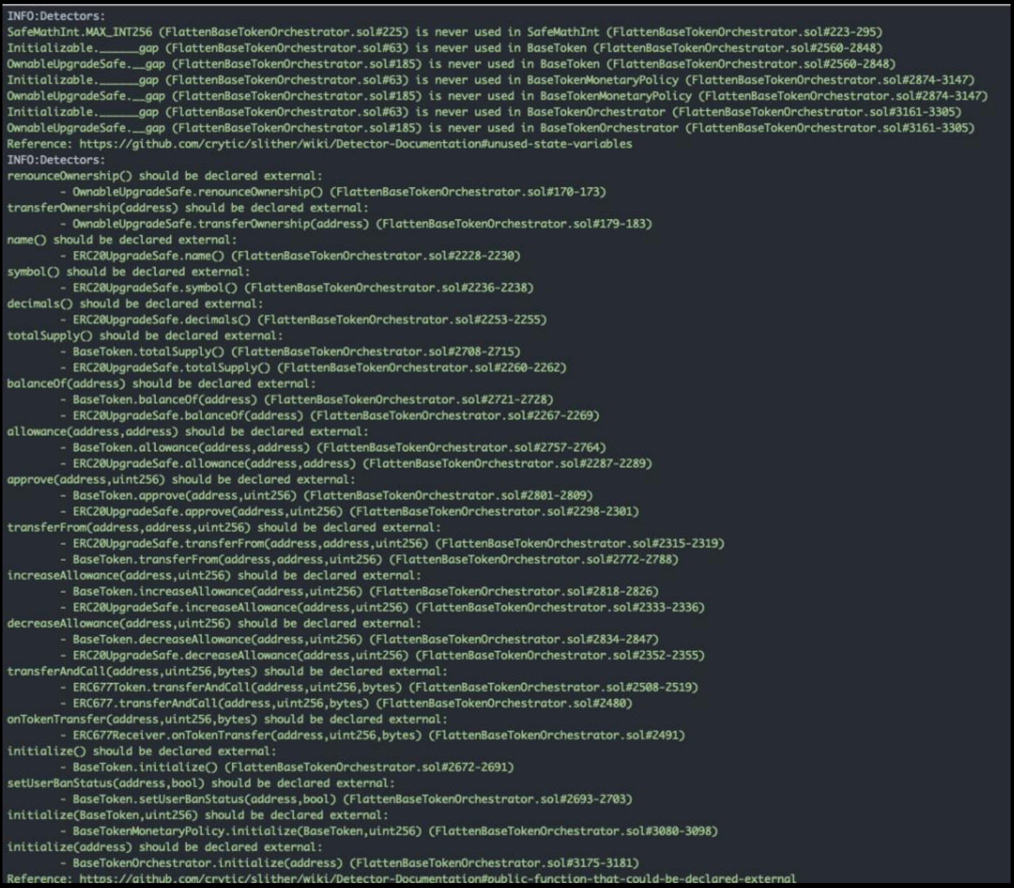
```
INFO:Detectors:
BaseTokenMonetaryPolicy.rebase() (FlattenBaseTokenOrchestrator.sol#2944-2984) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(lastRebaseTimestampSec.add(minRebaseTimeIntervalSec) < now,cannot rebase yet) (FlattenBaseTokenOrchestrator.sol#2949)
BaseTokenMonetaryPolicy.inRebaseWindow() (FlattenBaseTokenOrchestrator.sol#3104-3109) uses timestamp for comparisons
        Dangerous comparisons:
        - (now.mod(minRebaseTimeIntervalSec) >= rebaseWindowOffsetSec && now.mod(minRebaseTimeIntervalSec) < (rebaseWindowOffsetSec.add(rebaseWindowLengthSec))) (FlattenB
aseTokenOrchestrator.sol#3105-3108)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#block-timestamp
INFO:Detectors:
Initializable.isConstructor() (FlattenBaseTokenOrchestrator.sol#50-60) uses assembly
        - INLINE ASM (FlattenBaseTokenOrchestrator.sol#58)
console._sendLogPayload(bytes) (FlattenBaseTokenOrchestrator.sol#330-337) uses assembly
        - INLINE ASM (FlattenBaseTokenOrchestrator.sol#333-336)
Address.isContract(address) (FlattenBaseTokenOrchestrator.sol#2117-2126) uses assembly
        - INLINE ASM (FlattenBaseTokenOrchestrator.sol#2124)
ERC677Token.isContract(address) (FlattenBaseTokenOrchestrator.sol#2528-2537) uses assembly
        - INLINE ASM (FlattenBaseTokenOrchestrator.sol#2535)
BaseTokenOrchestrator.externalCall(address,bytes) (FlattenBaseTokenOrchestrator.sol#3274-3304) uses assembly
        - INLINE ASM (FlattenBaseTokenOrchestrator.sol#3279-3302)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage
INFO:Detectors:
BaseToken.transfer(address,uint256) (FlattenBaseTokenOrchestrator.sol#2736-2749) compares to a boolean constant:
        -require(bool,string)(bannedUsers[msg.sender] == false,you are banned) (FlattenBaseTokenOrchestrator.sol#2742)
BaseToken.transferFrom(address,address,uint256) (FlattenBaseTokenOrchestrator.sol#2772-2788) compares to a boolean constant:
        -require(bool,string)(bannedUsers[msg.sender] == false,you are banned) (FlattenBaseTokenOrchestrator.sol#2778)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#boolean-equality
```



```
INFO:Detectors:
Different versions of Solidity is used in :
        - Version used: ['0.6.12', '>=0.4.22<0.8.0', '>=0.4.24<0.7.0', '^0.6.0', '^0.6.2']
        - >=0.4.24<0.7.0 (FlattenBaseTokenOrchestrator.sol#3)
        - ^0.6.0 (FlattenBaseTokenOrchestrator.sol#68)
        - ^0.6.0 (FlattenBaseTokenOrchestrator.sol#109)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#216)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#299)
        - >=0.4.22<0.8.0 (FlattenBaseTokenOrchestrator.sol#325)
        - ^0.6.0 (FlattenBaseTokenOrchestrator.sol#1863)
        - ^0.6.0 (FlattenBaseTokenOrchestrator.sol#1941)
        - ^0.6.2 (FlattenBaseTokenOrchestrator.sol#2094)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#2155)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#2475)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#2487)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#2496)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#2542)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#2852)
        - 0.6.12 (FlattenBaseTokenOrchestrator.sol#3151)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#different-pragma-directives-are-used
INFO:Detectors:
Pragma version>=0.4.24<0.7.0 (FlattenBaseTokenOrchestrator.sol#3) allows old versions
Pragma version^0.6.0 (FlattenBaseTokenOrchestrator.sol#68) allows old versions
Pragma version^0.6.0 (FlattenBaseTokenOrchestrator.sol#109) allows old versions
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#216) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#299) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version>=0.4.22<0.8.0 (FlattenBaseTokenOrchestrator.sol#325) is too complex
Pragma version^0.6.0 (FlattenBaseTokenOrchestrator.sol#1863) allows old versions
Pragma version^0.6.0 (FlattenBaseTokenOrchestrator.sol#1941) allows old versions
Pragma version^0.6.2 (FlattenBaseTokenOrchestrator.sol#2094) allows old versions
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#2155) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#2475) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#2487) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#2496) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#2542) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#2852) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
Pragma version0.6.12 (FlattenBaseTokenOrchestrator.sol#3151) necessitates a version too recent to be trusted. Consider deploying with 0.6.11
solc-0.6.12 is not recommended for deployment
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity
INFO:Detectors:
Low level call in Address.sendValue(address,uint256) (FlattenBaseTokenOrchestrator.sol#2144-2150):
        - (success) = recipient.call{value: amount}() (FlattenBaseTokenOrchestrator.sol#2148)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls
```

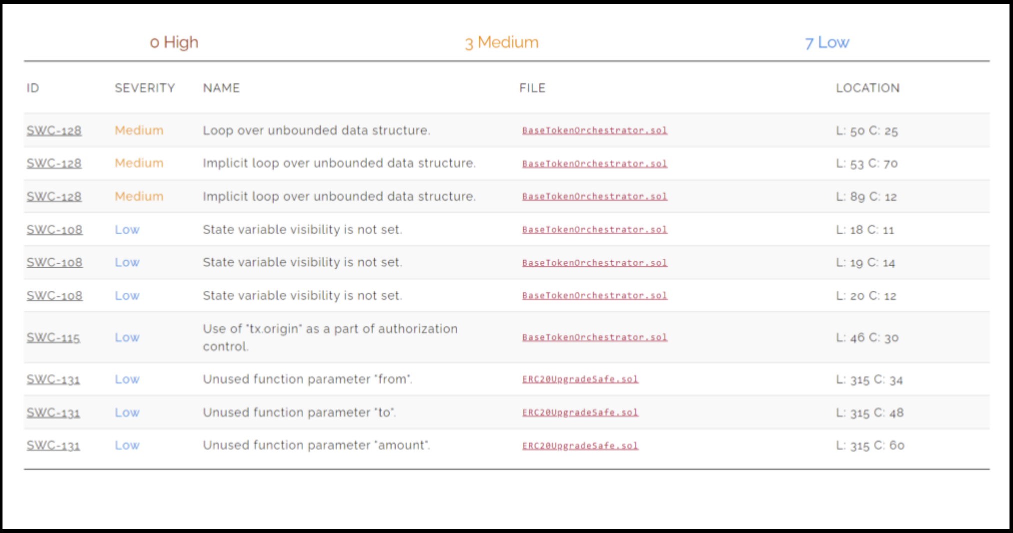


```
INFO:Detectors:
Variable Initializable.______gap (FlattenBaseTokenOrchestrator.sol#63) is not in mixedCase
Function ContextUpgradeSafe.__Context_init() (FlattenBaseTokenOrchestrator.sol#85-87) is not in mixedCase
Function ContextUpgradeSafe.__Context_init_unchained() (FlattenBaseTokenOrchestrator.sol#89-92) is not in mixedCase
Variable ContextUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#104) is not in mixedCase
Function OwnableUpgradeSafe.__Ownable_init() (FlattenBaseTokenOrchestrator.sol#133-136) is not in mixedCase
Function OwnableUpgradeSafe.__Ownable_init_unchained() (FlattenBaseTokenOrchestrator.sol#138-145) is not in mixedCase
Variable OwnableUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#185) is not in mixedCase
Contract console (FlattenBaseTokenOrchestrator.sol#327-1859) is not in CapWords
Function ERC20UpgradeSafe.__ERC20_init(string,string) (FlattenBaseTokenOrchestrator.sol#2210-2213) is not in mixedCase
Function ERC20UpgradeSafe.__ERC20_init_unchained(string,string) (FlattenBaseTokenOrchestrator.sol#2215-2222) is not in mixedCase
Variable ERC20UpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#2470) is not in mixedCase
Parameter ERC677Token.transferAndCall(address,uint256,bytes)._to (FlattenBaseTokenOrchestrator.sol#2508) is not in mixedCase
Parameter ERC677Token.transferAndCall(address,uint256,bytes)._value (FlattenBaseTokenOrchestrator.sol#2508) is not in mixedCase
Parameter ERC677Token.transferAndCall(address,uint256,bytes)._data (FlattenBaseTokenOrchestrator.sol#2508) is not in mixedCase
Parameter ERC677Token.contractFallback(address,uint256,bytes)._to (FlattenBaseTokenOrchestrator.sol#2521) is not in mixedCase
Parameter ERC677Token.contractFallback(address,uint256,bytes)._value (FlattenBaseTokenOrchestrator.sol#2521) is not in mixedCase
Parameter ERC677Token.contractFallback(address,uint256,bytes)._data (FlattenBaseTokenOrchestrator.sol#2521) is not in mixedCase
Parameter ERC677Token.isContract(address)._addr (FlattenBaseTokenOrchestrator.sol#2528) is not in mixedCase
Parameter BaseTokenMonetaryPolicy.initialize(BaseToken,uint256).BASE_ (FlattenBaseTokenOrchestrator.sol#3080) is not in mixedCase
Variable BaseTokenMonetaryPolicy.BASE (FlattenBaseTokenOrchestrator.sol#2887) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformity-to-solidity-naming-conventions
INFO:Detectors:
console.slitherConstructorConstantVariables() (FlattenBaseTokenOrchestrator.sol#327-1859) uses literals with too many digits:
        - CONSOLE_ADDRESS = address(0x000000000000000000636F6e736F6c652e6c6f67) (FlattenBaseTokenOrchestrator.sol#328)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits
```



```
INFO:Detectors:
SafeMathInt.MAX_INT256 (FlattenBaseTokenOrchestrator.sol#225) is never used in SafeMathInt (FlattenBaseTokenOrchestrator.sol#223-295)
Initializable.______gap (FlattenBaseTokenOrchestrator.sol#63) is never used in BaseToken (FlattenBaseTokenOrchestrator.sol#2560-2848)
OwnableUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#185) is never used in BaseToken (FlattenBaseTokenOrchestrator.sol#2560-2848)
Initializable.______gap (FlattenBaseTokenOrchestrator.sol#63) is never used in BaseTokenMonetaryPolicy (FlattenBaseTokenOrchestrator.sol#2874-3147)
OwnableUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#185) is never used in BaseTokenMonetaryPolicy (FlattenBaseTokenOrchestrator.sol#2874-3147)
Initializable.______gap (FlattenBaseTokenOrchestrator.sol#63) is never used in BaseTokenOrchestrator (FlattenBaseTokenOrchestrator.sol#3161-3305)
OwnableUpgradeSafe.__gap (FlattenBaseTokenOrchestrator.sol#185) is never used in BaseTokenOrchestrator (FlattenBaseTokenOrchestrator.sol#3161-3305)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-state-variables
INFO:Detectors:
renounceOwnership() should be declared external:
        - OwnableUpgradeSafe.renounceOwnership() (FlattenBaseTokenOrchestrator.sol#170-173)
transferOwnership(address) should be declared external:
        - OwnableUpgradeSafe.transferOwnership(address) (FlattenBaseTokenOrchestrator.sol#179-183)
name() should be declared external:
        - ERC20UpgradeSafe.name() (FlattenBaseTokenOrchestrator.sol#2228-2230)
symbol() should be declared external:
        - ERC20UpgradeSafe.symbol() (FlattenBaseTokenOrchestrator.sol#2236-2238)
decimals() should be declared external:
        - ERC20UpgradeSafe.decimals() (FlattenBaseTokenOrchestrator.sol#2253-2255)
totalSupply() should be declared external:
        - BaseToken.totalSupply() (FlattenBaseTokenOrchestrator.sol#2708-2715)
        - ERC20UpgradeSafe.totalSupply() (FlattenBaseTokenOrchestrator.sol#2260-2262)
balanceOf(address) should be declared external:
        - BaseToken.balanceOf(address) (FlattenBaseTokenOrchestrator.sol#2721-2728)
        - ERC20UpgradeSafe.balanceOf(address) (FlattenBaseTokenOrchestrator.sol#2267-2269)
allowance(address,address) should be declared external:
        - BaseToken.allowance(address,address) (FlattenBaseTokenOrchestrator.sol#2757-2764)
        - ERC20UpgradeSafe.allowance(address,address) (FlattenBaseTokenOrchestrator.sol#2287-2289)
approve(address,uint256) should be declared external:
        - BaseToken.approve(address,uint256) (FlattenBaseTokenOrchestrator.sol#2801-2809)
        - ERC20UpgradeSafe.approve(address,uint256) (FlattenBaseTokenOrchestrator.sol#2298-2301)
transferFrom(address,address,uint256) should be declared external:
        - ERC20UpgradeSafe.transferFrom(address,address,uint256) (FlattenBaseTokenOrchestrator.sol#2315-2319)
        - BaseToken.transferFrom(address,address,uint256) (FlattenBaseTokenOrchestrator.sol#2772-2788)
increaseAllowance(address,uint256) should be declared external:
        - BaseToken.increaseAllowance(address,uint256) (FlattenBaseTokenOrchestrator.sol#2818-2826)
        - ERC20UpgradeSafe.increaseAllowance(address,uint256) (FlattenBaseTokenOrchestrator.sol#2333-2336)
decreaseAllowance(address,uint256) should be declared external:
        - BaseToken.decreaseAllowance(address,uint256) (FlattenBaseTokenOrchestrator.sol#2834-2847)
        - ERC20UpgradeSafe.decreaseAllowance(address,uint256) (FlattenBaseTokenOrchestrator.sol#2352-2355)
transferAndCall(address,uint256,bytes) should be declared external:
        - ERC677Token.transferAndCall(address,uint256,bytes) (FlattenBaseTokenOrchestrator.sol#2508-2519)
        - ERC677.transferAndCall(address,uint256,bytes) (FlattenBaseTokenOrchestrator.sol#2480)
onTokenTransfer(address,uint256,bytes) should be declared external:
        - ERC677Receiver.onTokenTransfer(address,uint256,bytes) (FlattenBaseTokenOrchestrator.sol#2491)
initialize() should be declared external:
        - BaseToken.initialize() (FlattenBaseTokenOrchestrator.sol#2672-2691)
setUserBanStatus(address,bool) should be declared external:
        - BaseToken.setUserBanStatus(address,bool) (FlattenBaseTokenOrchestrator.sol#2693-2703)
initialize(BaseToken,uint256) should be declared external:
        - BaseTokenMonetaryPolicy.initialize(BaseToken,uint256) (FlattenBaseTokenOrchestrator.sol#3080-3098)
initialize(address) should be declared external:
        - BaseTokenOrchestrator.initialize(address) (FlattenBaseTokenOrchestrator.sol#3175-3181)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external
```

MythX detected 0 High findings, 3 Medium, and 7 Low.

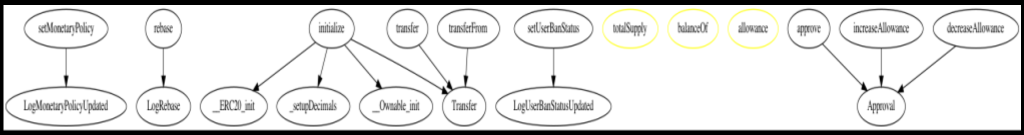


0 High | 3 Medium | 7 Low

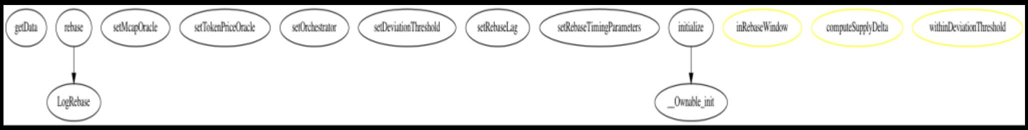
ID	SEVERITY	NAME	FILE	LOCATION
SWC-128	Medium	Loop over unbounded data structure.	BaseTokenOrchestrator.sol	L: 50 C: 25
SWC-128	Medium	Implicit loop over unbounded data structure.	BaseTokenOrchestrator.sol	L: 53 C: 70
SWC-128	Medium	Implicit loop over unbounded data structure.	BaseTokenOrchestrator.sol	L: 89 C: 12
SWC-108	Low	State variable visibility is not set.	BaseTokenOrchestrator.sol	L: 18 C: 11
SWC-108	Low	State variable visibility is not set.	BaseTokenOrchestrator.sol	L: 19 C: 14
SWC-108	Low	State variable visibility is not set.	BaseTokenOrchestrator.sol	L: 20 C: 12
SWC-115	Low	Use of "tx.origin" as a part of authorization control.	BaseTokenOrchestrator.sol	L: 46 C: 30
SWC-131	Low	Unused function parameter "from".	ERC20UpgradeSafe.sol	L: 315 C: 34
SWC-131	Low	Unused function parameter "to".	ERC20UpgradeSafe.sol	L: 315 C: 48
SWC-131	Low	Unused function parameter "amount".	ERC20UpgradeSafe.sol	L: 315 C: 60

3.6 SOLGRAPH - INFORMATIONAL

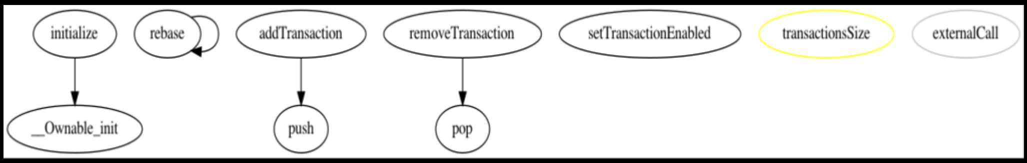
BaseToken.sol



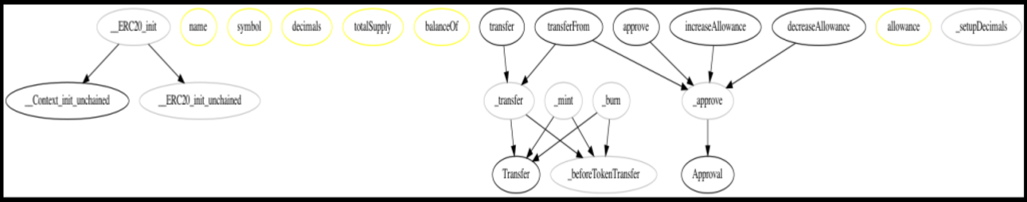
BaseTokenMonetaryPolicy.sol



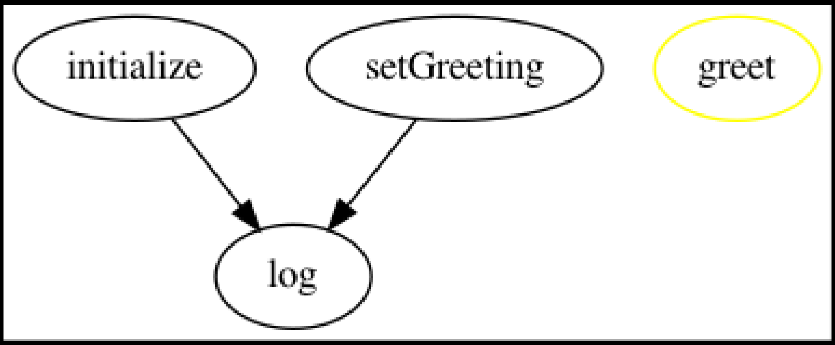
BaseTokenOrchestrastor.sol



ERC20UpgradeSafe.sol



Greeter.sol



THANK YOU FOR CHOOSING

// HALBORN