Ether Authority

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SMART CONTRACT

Security Audit Report

Project:	Bitindi Chain
Website:	https://bitindi.org
Platform:	Bitindi Chain Network
Language:	Solidity
Date:	January 9th, 2023

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THIS IS SECURITY AUDIT REPORT DOCUMENT AND WHICH MAY CONTAIN INFORMATION WHICH IS CONFIDENTIAL. WHICH INCLUDES ANY POTENTIAL VULNERABILITIES AND MALICIOUS CODES WHICH CAN BE USED TO EXPLOIT THE SOFTWARE. THIS MUST BE REFERRED INTERNALLY AND ONLY SHOULD BE MADE AVAILABLE TO THE PUBLIC AFTER ISSUES ARE RESOLVED.

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Introduction

EtherAuthority was contracted by Bitindi Chain to perform the Security audit of the Bitindi Chain protocol smart contracts code. The audit has been performed using manual analysis as well as using automated software tools. This report presents all the findings regarding the audit performed on January 9th, 2023.

The purpose of this audit was to address the following:

- Ensure that all claimed functions exist and function correctly.
- Identify any security vulnerabilities that may be present in the smart contract.

Project Background

- Bitindi Chain is an EVM compatible chain for DeFi with BPoC consensus.
- Bitindi is a layer 1 blockchain for DeFi, NFTs and gaming. It is built with GO, has EVM support and uses BPoS consensus mechanism.
- The audit scope consists of system smart contracts of the Bitindi Chain. The system smart contracts contribute heavily to the consensus mechanism.
- The system smart contracts performs actions such as Validations, system staking, punishments, etc.

Audit scope

Name	Code Review and Security Analysis Report for Bitindi Chain System Smart Contracts
Platform	**Bitindi Chain Network / Solidity**
File 1	Params.sol
File 1 Github Commit	8934bd3061e60c318df9964c3bce5cc5aa4fc415
File 2	Proposal.sol
File 2 Github Commit	a275e201f5eaaa8d905c0f34f4d6ceac89a13dc5
File 3	Punish.sol
File 3 Github Commit	968edb382b8844a48e35896325784c802c5bb0b4
File 4	Validators.sol
File 4 Github Commit	2e735aa622a3645fefe04eb6bd0f381ee2b052ba
File 5	SafeMath.sol
File 5 Github Commit	43e71365448f47ce2bca5cdfc80a47223de5a048
File 6	Bridge.sol
File 6 Github Commit	5048350ff9ba9887de0fb0c82947649aed51744e
File 7	PeggedToken.sol
File 7 Github Commit	fdc345f789750d4a19047524f7359a3717c01534
Audit Date	January 9th, 2023

Claimed Smart Contract Features

Claimed Feature Detail	Our Observation
HPN Tokenomics • Coin name: Bitindi Chain • Coin symbol: BNI • Decimal: 18 • Total Supply: 50 Million • No more coins generated ever	**YES, This is valid.**
Validators.sol • Maximum Validators: 21 • Minimal Staking Coin: 32 BNI	**YES, This is valid.**
Punish.sol • The validator can be punished for misbehavior. • Validators can clean validator's punish records if one restake in.	**YES, This is valid.**
Params.sol • It holds parameters of other smart contracts	**YES, This is valid.**
Proposal.sol • New validator has to be voted by over 50% of validators	**YES, This is valid.**
Bridge.sol • It allows ETH, BSC and Polygon assets to be exchanged for the Bitindi chain assets • This is a centralized solution and has heavy ownership control.	**YES, This is valid.**
PeggedToken.sol • BIP-20 token standard, which is similar to ERC20 • This is a centralized solution and the owner has full control of token minting and burning. • Unlimited tokens can be minted. so, use caution.	**YES, This is valid.**

Audit Summary

According to the standard audit assessment, Customer`s solidity smart contracts are **“Secured”**. Also, these contracts do contain owner control, which does not make them fully decentralized.

We used various tools like Slither, Solhint and Remix IDE. At the same time this finding is based on critical analysis of the manual audit.
All issues found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the Audit overview section. General overview is presented in AS-IS section and all identified issues can be found in the Audit overview section.

We found 0 critical, 0 high, 0 medium and 0 low and some very low level issues.

Investors Advice: Technical audit of the smart contract does not guarantee the ethical nature of the project. Any owner controlled functions should be executed by the owner with responsibility. All investors/users are advised to do their due diligence before investing in the project.

Technical Quick Stats

Main Category	Subcategory	Result
Contract Programming	Solidity version not specified	Passed
	Solidity version too old	Passed
	Integer overflow/underflow	Passed
	Function input parameters lack of check	Passed
	Function input parameters check bypass	Passed
	Function access control lacks management	Passed
	Critical operation lacks event log	Moderated
	Human/contract checks bypass	Passed
	Random number generation/use vulnerability	N/A
	Fallback function misuse	Passed
	Race condition	Passed
	Logical vulnerability	Passed
	Features claimed	Passed
	Other programming issues	Passed
Code Specification	Function visibility not explicitly declared	Passed
	Var. storage location not explicitly declared	Passed
	Use keywords/functions to be deprecated	Passed
	Unused code	Passed
Gas Optimization	“Out of Gas” Issue	Passed
	High consumption ‘for/while’ loop	Moderated
	High consumption ‘storage’ storage	Passed
	Assert() misuse	Passed
Business Risk	The maximum limit for mintage not set	Passed
	“Short Address” Attack	Passed
	“Double Spend” Attack	Passed

Overall Audit Result: **PASSED**

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Code Quality

This audit scope has 7 smart contract files. Smart contracts contain Libraries, Smart contracts, inherits and Interfaces. This is a compact and well written smart contract.

The libraries in Bitindi Chain Protocol are part of its logical algorithm. A library is a different type of smart contract that contains reusable code. Once deployed on the blockchain (only once), it is assigned a specific address and its properties / methods can be reused many times by other contracts in the Bitindi Chain Protocol.

The Bitindi Chain team has not provided unit test scripts, which would not help to determine the integrity of the code in an automated way.

All code parts are not well commented on smart contracts.

Documentation

We were given a Bitindi Chain smart contract code in the form of a Github link. The hash of that code is mentioned above in the table.

As mentioned above, code parts are not well commented. But the logic is straightforward. So it is easy to quickly understand the programming flow as well as complex code logic. Comments are very helpful in understanding the overall architecture of the protocol.

Another source of information was its website: https://bitindi.org which provided rich information about the project architecture.

Use of Dependencies

As per our observation, the libraries are used in this smart contracts infrastructure that are based on well known industry standard open source projects.

Apart from libraries, its functions are used in external smart contract calls.

AS-IS overview

Params.sol

Functions

Sl.	Functions	Type	Observation	Conclusion
1	constructor	write	Passed	No Issue
2	onlyMiner	modifier	Passed	No Issue
3	onlyNotInitialized	modifier	Passed	No Issue
4	onlyInitialized	modifier	Passed	No Issue
5	onlyPunishContract	modifier	Passed	No Issue
6	onlyBlockEpoch	modifier	Passed	No Issue
7	onlyValidatorsContract	modifier	Passed	No Issue
8	onlyProposalContract	modifier	Passed	No Issue

Proposal.sol

Functions

Sl.	Functions	Type	Observation	Conclusion
1	constructor	write	Passed	No Issue
2	onlyMiner	modifier	Passed	No Issue
3	onlyNotInitialized	modifier	Passed	No Issue
4	onlyInitialized	modifier	Passed	No Issue
5	onlyPunishContract	modifier	Passed	No Issue
6	onlyBlockEpoch	modifier	Passed	No Issue
7	onlyValidatorsContract	modifier	Passed	No Issue
8	onlyProposalContract	modifier	Passed	No Issue
9	onlyValidator	modifier	Passed	No Issue
10	initialize	external	Infinite loops possibility, Critical operation lacks event log	Refer Audit Findings
11	createProposal	external	Passed	No Issue
12	voteProposal	external	access only Validator	No Issue
13	setUnpassed	external	access only Validators Contract	No Issue

Punish.sol

Functions

Sl.	Functions	Type	Observation	Conclusion
1	constructor	write	Passed	No Issue
2	onlyMiner	modifier	Passed	No Issue
3	onlyNotInitialized	modifier	Passed	No Issue
4	onlyInitialized	modifier	Passed	No Issue
5	onlyPunishContract	modifier	Passed	No Issue
6	onlyBlockEpoch	modifier	Passed	No Issue
7	onlyValidatorsContract	modifier	Passed	No Issue
8	onlyProposalContract	modifier	Passed	No Issue
9	onlyNotPunished	modifier	Passed	No Issue
10	onlyNotDecreased	modifier	Passed	No Issue
11	initialize	external	access only NotInitialized	No Issue
12	punish	external	access only Miner	No Issue
13	decreaseMissedBlocksCounter	external	access only Miner	No Issue
14	cleanPunishRecord	external	Critical operation lacks event log	Refer Audit Findings
15	getPunishValidatorsLen	read	Passed	No Issue
16	getPunishRecord	read	Passed	No Issue

Validators.sol

Functions

Sl.	Functions	Type	Observation	Conclusion
1	constructor	write	Passed	No Issue
2	onlyMiner	modifier	Passed	No Issue
3	onlyNotInitialized	modifier	Passed	No Issue
4	onlyInitialized	modifier	Passed	No Issue
5	onlyPunishContract	modifier	Passed	No Issue
6	onlyBlockEpoch	modifier	Passed	No Issue
7	onlyValidatorsContract	modifier	Passed	No Issue
8	onlyProposalContract	modifier	Passed	No Issue
9	onlyNotRewarded	modifier	Passed	No Issue
10	onlyNotUpdated	modifier	Passed	No Issue
11	setContractCreator	write	Critical operation lacks event log	Refer Audit Findings
12	initialize	external	Infinite loops possibility, Critical operation lacks event log	Refer Audit Findings
13	stake	external	access only Initialized	No Issue
14	createOrEditValidator	external	access only Initialized	No Issue

15	tryReactive	external	access only Initialized	No Issue
16	unstake	external	access only Initialized	No Issue
17	withdrawStakingReward	write	Passed	No Issue
18	withdrawStaking	external	Passed	No Issue
19	withdrawProfits	external	Passed	No Issue
20	distributeBlockReward	external	Infinite loops possibility	Refer Audit Findings
21	updateActiveValidatorSet	write	access only Miner	No Issue
22	removeValidator	external	access only Punish Contract	No Issue
23	removeValidatorIncoming	external	access only Punish Contract	No Issue
24	getValidatorDescription	read	Passed	No Issue
25	getValidatorInfo	read	Passed	No Issue
26	getStakingInfo	read	Passed	No Issue
27	getActiveValidators	read	Passed	No Issue
28	getTotalStakeOfActiveValidators	read	Passed	No Issue
29	getTotalStakeOfActiveValidators Except	read	Passed	No Issue
30	isActiveValidator	read	Passed	No Issue
31	isTopValidator	read	Passed	No Issue
32	getTopValidators	read	Passed	No Issue
33	validateDescription	write	Passed	No Issue
34	tryAddValidatorToHighestSet	internal	Passed	No Issue
35	tryRemoveValidatorIncoming	write	Passed	No Issue
36	addProfitsToActiveValidatorsByStakePercentExcept	write	Passed	No Issue
37	tryJailValidator	write	Passed	No Issue
38	tryRemoveValidatorInHighestSet	write	Passed	No Issue
39	viewStakeReward	read	Passed	No Issue

Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to token loss etc.
High	High-level vulnerabilities are difficult to exploit; however, they also have significant impact on smart contract execution, e.g. public access to crucial
Medium	Medium-level vulnerabilities are important to fix; however, they can't lead to tokens loss
Low	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can't have significant impact on execution
Lowest / Code Style / Best Practice	Lowest-level vulnerabilities, code style violations and info statements can't affect smart contract execution and can be ignored.

Audit Findings

Critical Severity

No critical severity vulnerabilities were found.

High Severity

No high severity vulnerabilities were found.

Medium

No medium severity vulnerabilities were found.

Low

No Low severity vulnerabilities were found.

Very Low / Informational / Best practices:

(1) SafeMath not used: **- Validators.sol**

```
// distributeBlockReward distributes block reward to all active validators
function distributeBlockReward(address[] memory _to, uint64[] memory _gass)
    external
    payable
    onlyMiner
    onlyNotRewarded
    onlyInitialized
{
    operationsDone[block.number][uint8(Operations.Distribute)] = true;
    address val = msg.sender;
    uint256 reward = msg.value;
    uint256 remaining = reward;

    //to validator
    uint _validatorPart = reward * validatorPartPercent / 100000;
    remaining = remaining - _validatorPart;

    //to burn
    uint _burnPart = reward * burnPartPercent / 100000;
    if(totalBurnt + _burnPart <= burnStopAmount )
    {
        remaining = remaining - _burnPart;
        totalBurnt += _burnPart;
        if(_burnPart > 0) address(0).transfer(_burnPart);
```

In the "distributeBlockReward()" function, SafeMath library has not been used.

Resolution: We checked and no direct overflow/underflow is possible. But we suggest using the safemath functions to avoid any possible reentrancy issues.

Status: We got confirmation from Bitindi chain team to acknowledge this issue, as no direct overflow/underflow is possible.

(2) Spelling mistake: **- Validators.sol**

```
// stake at first time to this valiadtor
if (staked[staker][validator].coins == 0) {
```

Spelling mistakes in comments.
"valiadtor" word should be **"validator."**

Resolution: Correct the spelling.

Status: This is acknowledged by the Bitindi chain team

(3) Compile time error: **- Proposal.sol**

```
1   // SPDX-License-Identifier: MIT
2   pragma solidity >=0.6.0 <0.8.0;
3
4   import "Params.sol";
5   import "Validators.sol";
6   3
7   contract Proposal is Params {
8       // How long a proposal will exist
```

There is found typed number "**3**" in line number "**6**" of the contract code, it gives a compile time error.

Resolution: We suggest removing 3 numbers from contract code line number 6.

Status: The Bitindi team has fixed this issue.

(4) Critical operation lacks event log:

Missing event log for:

Validators.sol

- initialize()

Proposal.sol

- initialize()

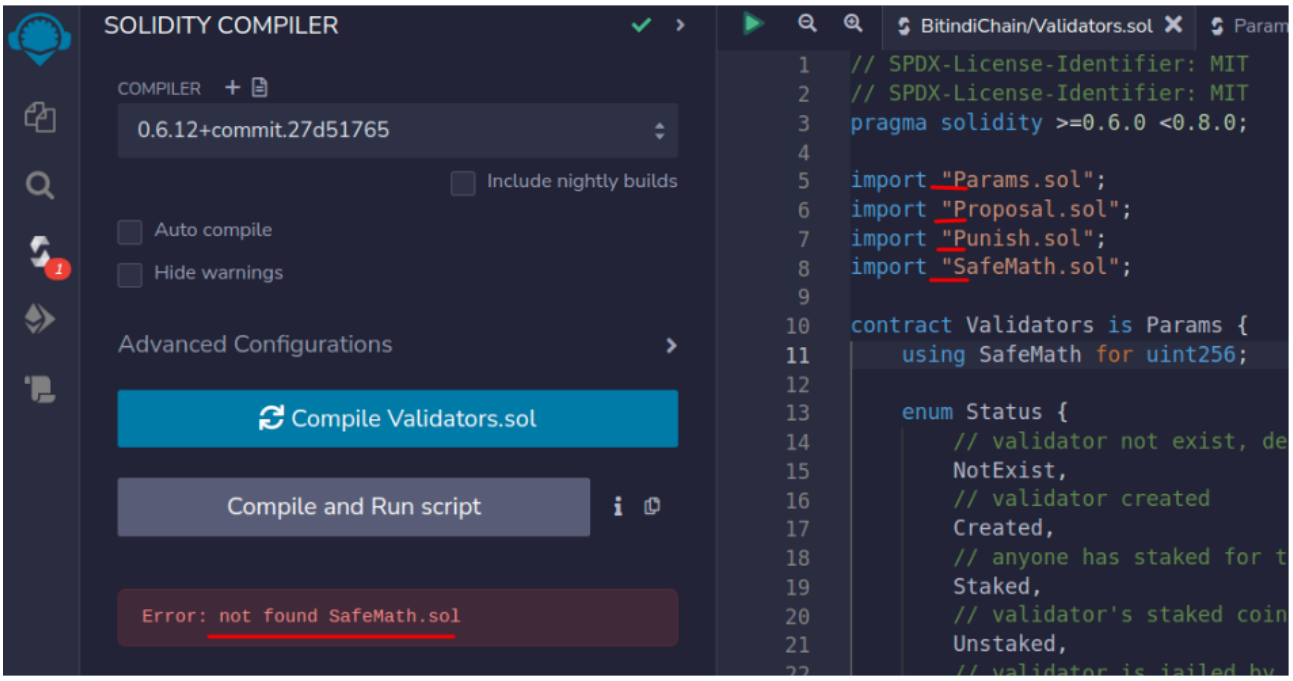
Punish.sol

- cleanPunishRecord()

Resolution: Please write an event log for listed events.

Status: This issue is acknowledged by the Bitindi chain, as these functions are called by the system and not called again ever.

(5) Compile time error:



There are import 4 contract files path are:

import "Params.sol";

import "Proposal.sol";

import "Punish.sol";

import "SafeMath.sol";

Resolution: Import contract file path should be:

import "./Params.sol";

import "./Proposal.sol";

import "./Punish.sol";

import "./SafeMath.sol";

Status: This issue is fixed while contract deployment

(6) Infinite loops possibility:

Validators.sol

```
function initialize(address[] calldata vals) external onlyNotInitialized {
    proposal = Proposal(ProposalAddr);
    punish = Punish(PunishContractAddr);

    for (uint256 i = 0; i < vals.length; i++) {
        require(vals[i] != address(0), "Invalid validator address");
        lastRewardTime[vals[i]] = block.timestamp;
```

```
// distributeBlockReward distributes block reward to all active validators
function distributeBlockReward(address[] memory _to, uint64[] memory _gass)
    external
    payable
    onlyMiner
    onlyNotRewarded
    onlyInitialized
{
    operationsDone[block.number][uint8(Operations.Distribute)] = true;
    address val = msg.sender;
    uint256 reward = msg.value;
    uint256 remaining = reward;

    //to validator
    uint _validatorPart = reward * validatorPartPercent / 100000;
    remaining = remaining - _validatorPart;

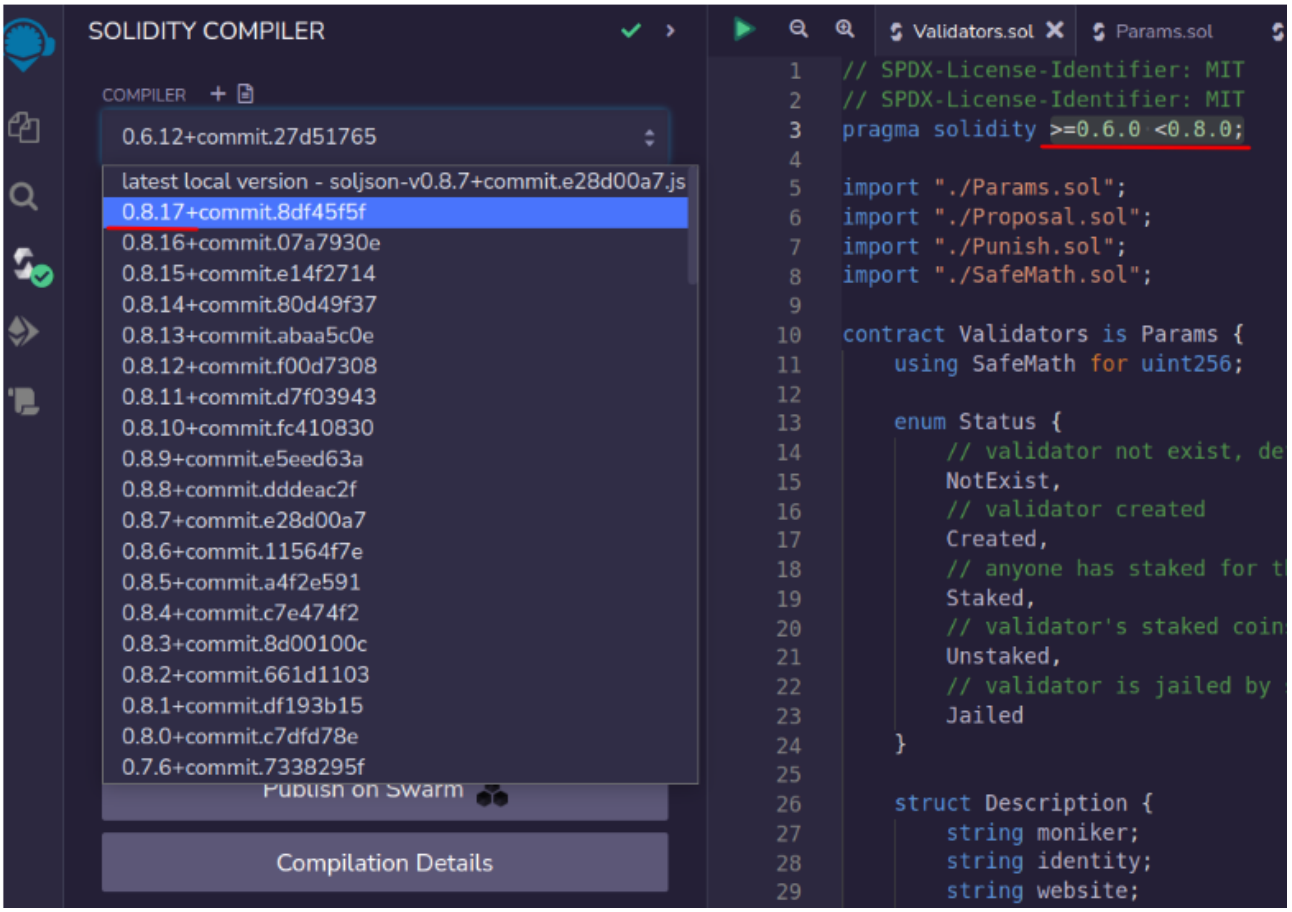
    //to burn
    uint _burnPart = reward * burnPartPercent / 100000;
    if(totalBurnt + _burnPart <= burnStopAmount )
    {
        remaining = remaining - _burnPart;
        totalBurnt += _burnPart;
        if(_burnPart > 0) address(0).transfer(_burnPart);
    }
    // to contract
    //uint _contractPart = reward * contractPartPercent / 100000;
    for (uint i=0; i<_to.length; i++)
```

As array elements will increase, then it will cost more and more gas. And eventually, it will stop all the functionality. After several hundreds of transactions, all those functions depending on it will stop. We suggest avoiding loops. For example, use mapping to store the array index. And query that data directly, instead of looping through all the elements to find an element.

Resolution: Adjust logic to replace loops with mapping or other code structure.

Status: This issue is acknowledged by the Bitindi chain team as this records will never be more than 21

(7) Please use the latest compiler version when deploying contracts:



This is not a severe issue, but we suggest using the latest compiler version at the time of contract deployment, which is 0.8.17 at the time of this audit. Using the latest compiler version is always recommended which prevents any compiler level issues.

Status: This issue is acknowledge

Centralization

This smart contract has some functions which can be executed by the Admin (Owner) only. If the admin wallet private key would be compromised, then it would create trouble. Following are Admin functions:

- coinOut function in Bridge contract can let signer wallet to take all coins out.
- tokenOut function in the Bridge contract can let the signer wallet take all the tokens out.
- transferOwnership function in Bridge and Pegged token smart contract can let the owner to transfer the ownership to another wallet.
- mint function in the PeggedToken smart contract can let owner to mint tokens.

To make the smart contract 100% decentralized, we suggest renouncing ownership in the smart contract once its function is completed.

Conclusion

We were given a contract code in the form of a github link. And we have used all possible tests based on given objects as files. We have observed some informational issues in the smart contracts. But those are not critical ones. **So smart contracts are good to go for the mainnet deployment**.

Since possible test cases can be unlimited for such smart contracts protocol, we provide no such guarantee of future outcomes. We have used all the latest static tools and manual observations to cover maximum possible test cases to scan everything.

Smart contracts within the scope were manually reviewed and analyzed with static analysis tools. Smart Contract's high-level description of functionality was presented in the As-is overview section of the report.

Audit report contains all found security vulnerabilities and other issues in the reviewed code.

Security state of the reviewed contract, based on standard audit procedure scope, is **"Secure".**

Our Methodology

We like to work with a transparent process and make our reviews a collaborative effort. The goals of our security audits are to improve the quality of systems we review and aim for sufficient remediation to help protect users. The following is the methodology we use in our security audit process.

Manual Code Review:

In manually reviewing all of the code, we look for any potential issues with code logic, error handling, protocol and header parsing, cryptographic errors, and random number generators. We also watch for areas where more defensive programming could reduce the risk of future mistakes and speed up future audits. Although our primary focus is on the in-scope code, we examine dependency code and behavior when it is relevant to a particular line of investigation.

Vulnerability Analysis:

Our audit techniques included manual code analysis, user interface interaction, and whitebox penetration testing. We look at the project's web site to get a high level understanding of what functionality the software under review provides. We then meet with the developers to gain an appreciation of their vision of the software. We install and use the relevant software, exploring the user interactions and roles. While we do this, we brainstorm threat models and attack surfaces. We read design documentation, review other audit results, search for similar projects, examine source code dependencies, skim open issue tickets, and generally investigate details other than the implementation.

Documenting Results:

We follow a conservative, transparent process for analyzing potential security vulnerabilities and seeing them through successful remediation. Whenever a potential issue is discovered, we immediately create an Issue entry for it in this document, even though we have not yet verified the feasibility and impact of the issue. This process is conservative because we document our suspicions early even if they are later shown to not represent exploitable vulnerabilities. We generally follow a process of first documenting the suspicion with unresolved questions, then confirming the issue through code analysis, live experimentation, or automated tests. Code analysis is the most tentative, and we strive to provide test code, log captures, or screenshots demonstrating our confirmation. After this we analyze the feasibility of an attack in a live system.

Suggested Solutions:

We search for immediate mitigations that live deployments can take, and finally we suggest the requirements for remediation engineering for future releases. The mitigation and remediation recommendations should be scrutinized by the developers and deployment engineers, and successful mitigation and remediation is an ongoing collaborative process after we deliver our report, and before the details are made public.

Disclaimers

EtherAuthority.io Disclaimer

EtherAuthority team has analyzed this smart contract in accordance with the best industry practices at the date of this report, in relation to: cybersecurity vulnerabilities and issues in smart contract source code, the details of which are disclosed in this report, (Source Code); the Source Code compilation, deployment and functionality (performing the intended functions).

Due to the fact that the total number of test cases are unlimited, the audit makes no statements or warranties on security of the code. It also cannot be considered as a sufficient assessment regarding the utility and safety of the code, bugfree status or any other statements of the contract. While we have done our best in conducting the analysis and producing this report, it is important to note that you should not rely on this report only. We also suggest conducting a bug bounty program to confirm the high level of security of this smart contract.

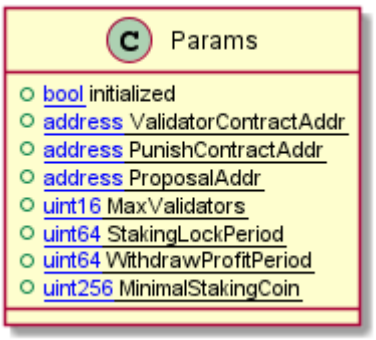
Technical Disclaimer

Smart contracts are deployed and executed on the blockchain platform. The platform, its programming language, and other software related to the smart contract can have their own vulnerabilities that can lead to hacks. Thus, the audit can’t guarantee explicit security of the audited smart contracts.

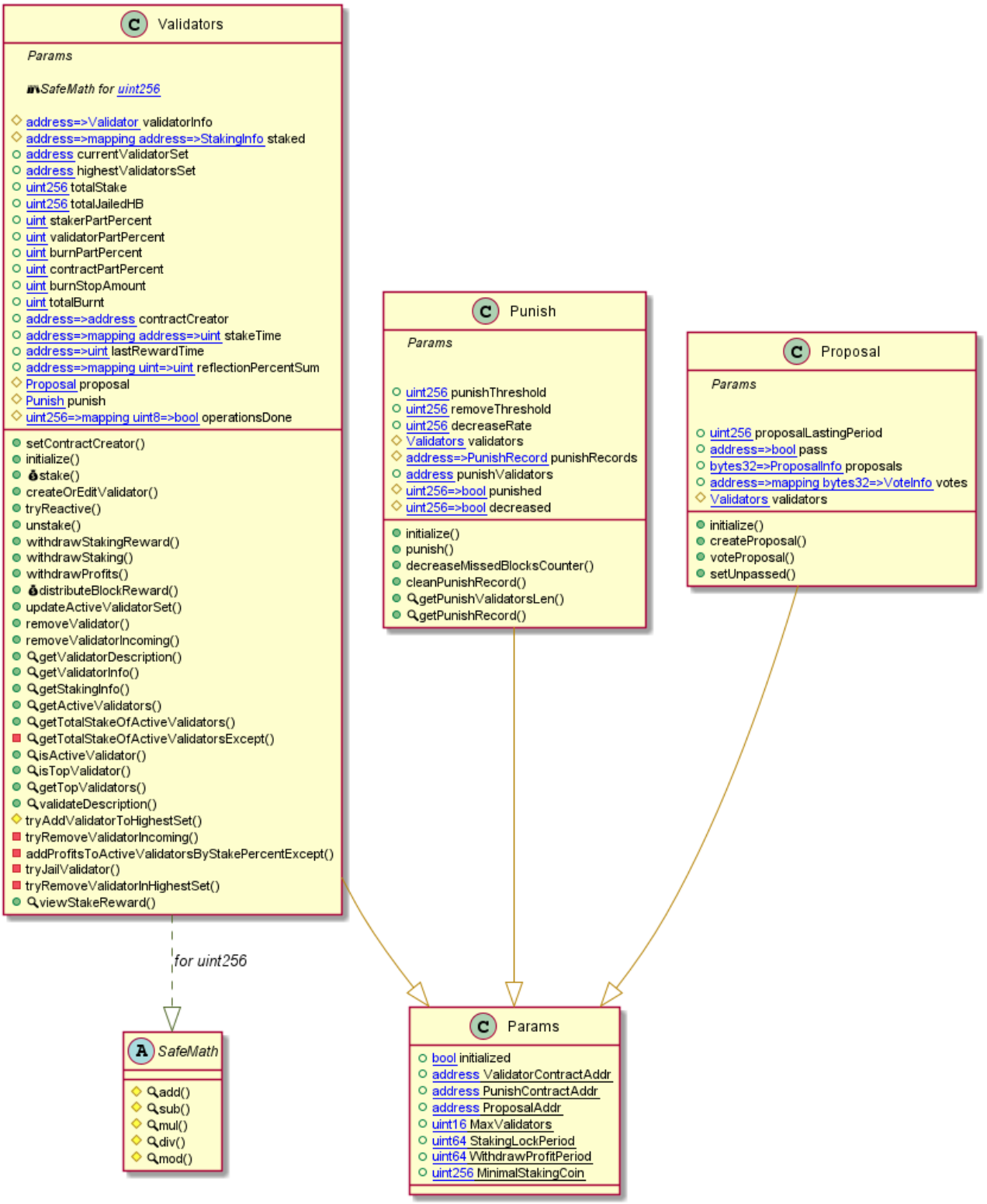
Appendix

Code Flow Diagram - Bitindi Chain Protocol

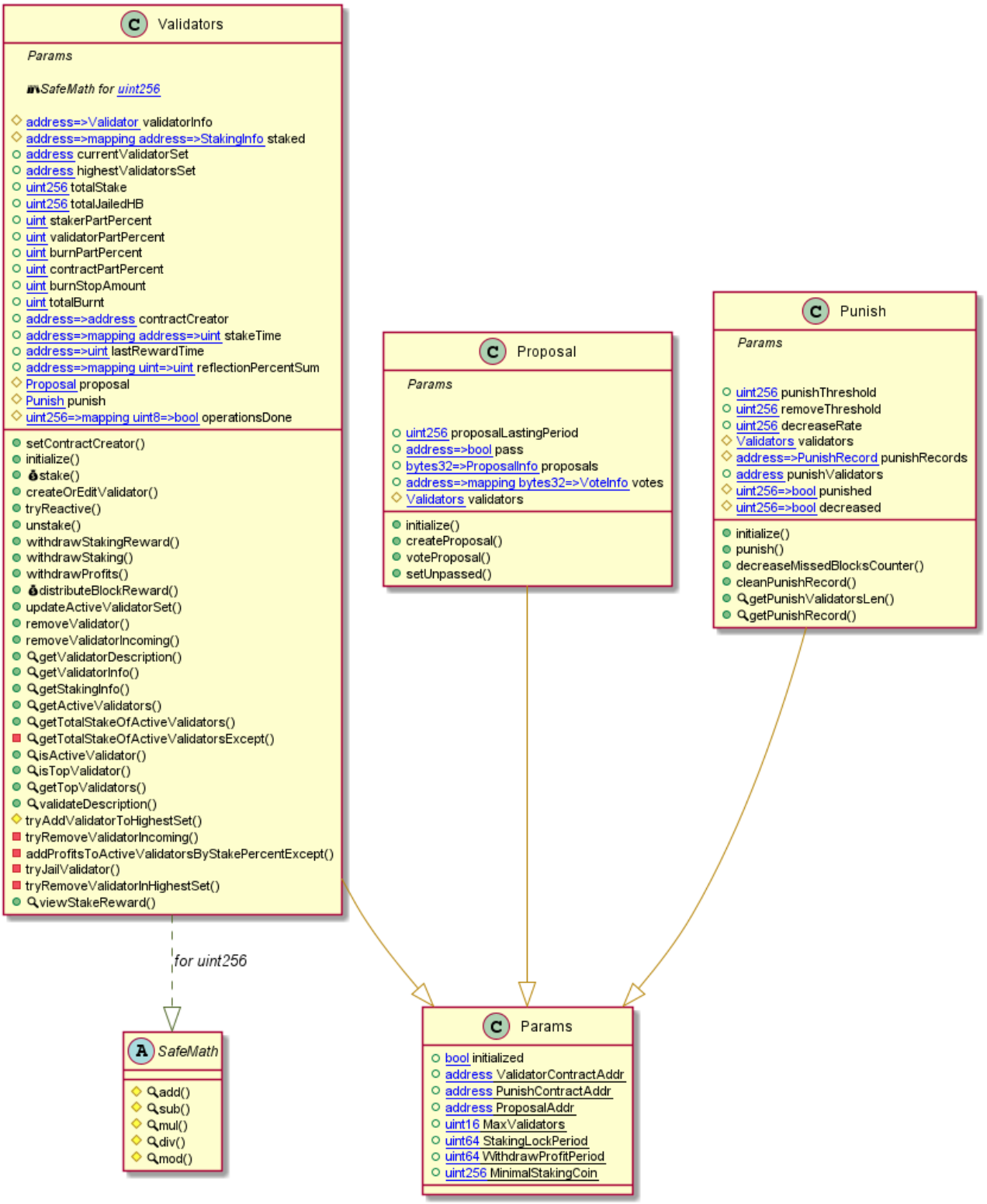
Params Diagram



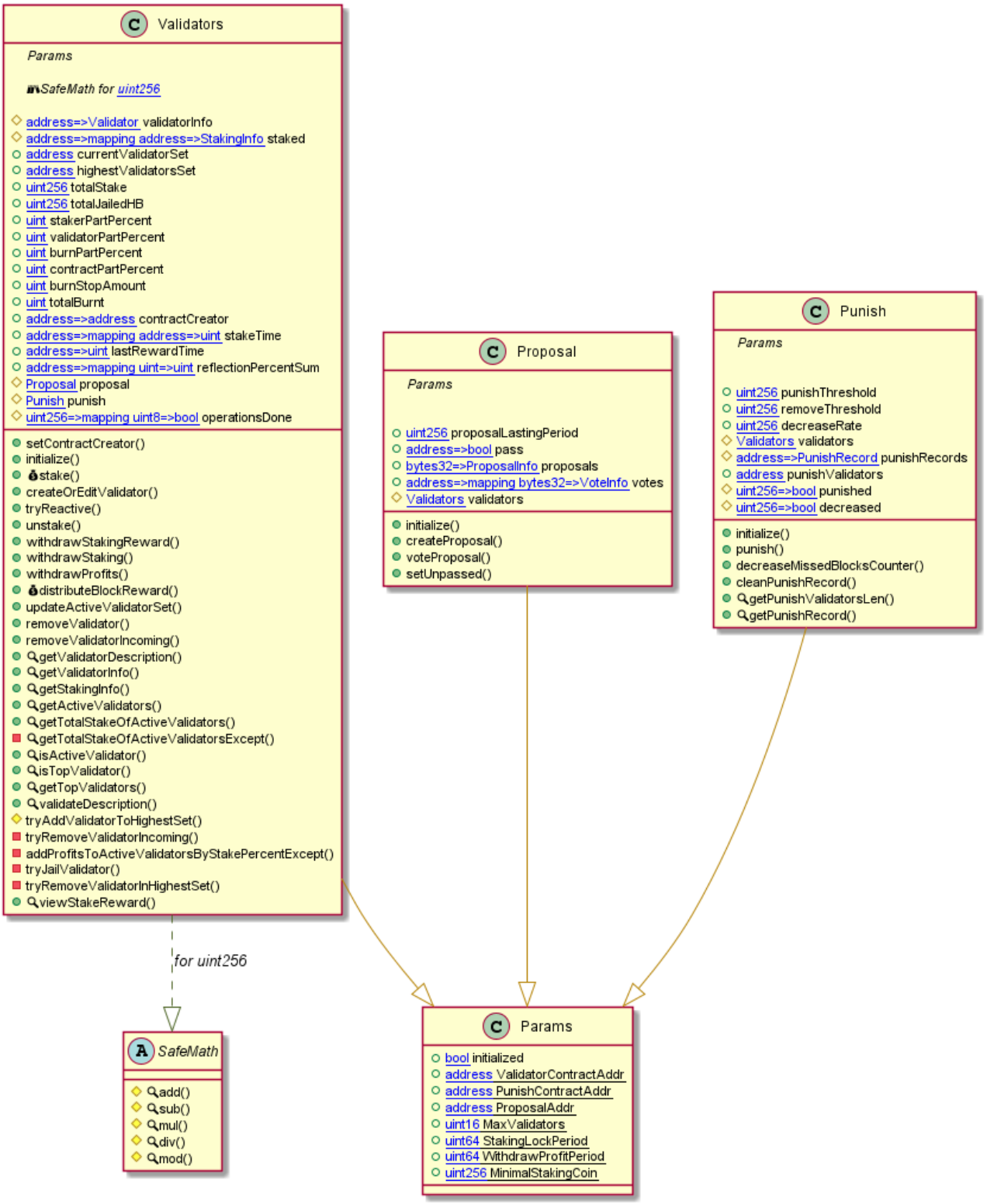
Proposal Diagram



Punish Diagram



Validators Diagram



Slither Results Log

Slither Log >> Params.sol

```
INFO:Detectors:
Pragma version>=0.6.0<0.8.0 (Params.sol#2) is too complex
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity
INFO:Detectors:
Constant Params.ValidatorContractAddr (Params.sol#8-9) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.PunishContractAddr (Params.sol#10-11) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.ProposalAddr (Params.sol#12-13) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MaxValidators (Params.sol#16) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.StakingLockPeriod (Params.sol#18) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.WithdrawProfitPeriod (Params.sol#20) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MinimalStakingCoin (Params.sol#21) is not in UPPER_CASE_WITH_UNDERSCORES
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions
INFO:Detectors:
Params.slitherConstructorConstantVariables() (Params.sol#4-60) uses literals with too many digits:
        - ValidatorContractAddr = 0x0000000000000000000000000000000000000f000 (Params.sol#8-9)
Params.slitherConstructorConstantVariables() (Params.sol#4-60) uses literals with too many digits:
        - PunishContractAddr = 0x0000000000000000000000000000000000000F001 (Params.sol#10-11)
Params.slitherConstructorConstantVariables() (Params.sol#4-60) uses literals with too many digits:
        - ProposalAddr = 0x0000000000000000000000000000000000000F002 (Params.sol#12-13)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits
INFO:Detectors:
Params.initialized (Params.sol#5) should be constant
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variables-that-could-be-declared-constant
INFO:Slither:Params.sol analyzed (1 contracts with 75 detectors), 14 result(s) found
INFO:Slither:Use https://crytic.io/ to get access to additional detectors and Github integration
```

Slither Log >> Proposal.sol

```
INFO:Detectors:
Validators.withdrawStaking(address).staker (Proposal.sol#751) lacks a zero-check on :
                - staker.transfer(staking) (Proposal.sol#770)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#missing-zero-address-validation
INFO:Detectors:
Validators.distributeBlockReward(address[],uint64[]) (Proposal.sol#817-878) has external calls inside a loop: address(contractC
reator[_to[i]]).transfer(amt) (Proposal.sol#851)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation/#calls-inside-a-loop
INFO:Detectors:
Reentrancy in Validators.unstake(address) (Proposal.sol#671-732):
        External calls:
        - proposal.setUnpassed(validator) (Proposal.sol#724)
        External calls sending eth:
        - withdrawStakingReward(validator) (Proposal.sol#727)
                - msg.sender.transfer(reward) (Proposal.sol#744)
        State variables written after the call(s):
        - withdrawStakingReward(validator) (Proposal.sol#727)
                - stakeTime[msg.sender][validator] = lastRewardTime[validator] (Proposal.sol#742)
        - stakeTime[staker][validator] = 0 (Proposal.sol#728)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-2
INFO:Detectors:
Reentrancy in Punish.punish(address) (Proposal.sol#259-284):
        External calls:
        - validators.removeValidator(val) (Proposal.sol#274)
        - validators.removeValidatorIncoming(val) (Proposal.sol#280)
        Event emitted after the call(s):
        - LogPunishValidator(val,block.timestamp) (Proposal.sol#283)
Reentrancy in Validators.removeValidator(address) (Proposal.sol#895-910):
        External calls:
        - proposal.setUnpassed(val) (Proposal.sol#907)
        Event emitted after the call(s):
        - LogRemoveValidator(val,hb,block.timestamp) (Proposal.sol#908)
Reentrancy in Validators.tryReactive(address) (Proposal.sol#649-669):
        External calls:
        - require(bool,string)(punish.cleanPunishRecord(validator),clean failed) (Proposal.sol#664)
        Event emitted after the call(s):
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        - LogReactive(validator,block.timestamp) (Proposal.sol#668)
Reentrancy in Validators.unstake(address) (Proposal.sol#671-732):
        External calls:
        - proposal.setUnpassed(validator) (Proposal.sol#724)
        External calls sending eth:
        - withdrawStakingReward(validator) (Proposal.sol#727)
                - msg.sender.transfer(reward) (Proposal.sol#744)
        Event emitted after the call(s):
        - LogUnstake(staker,validator,unstakeAmount,block.timestamp) (Proposal.sol#730)
        - withdrawStakingRewardEv(msg.sender,validator,reward,block.timestamp) (Proposal.sol#745)
                - withdrawStakingReward(validator) (Proposal.sol#727)
Reentrancy in Proposal.voteProposal(bytes32,bool) (Proposal.sol#1341-1396):
        External calls:
        - validators.tryReactive(proposals[id].dst) (Proposal.sol#1381)
        Event emitted after the call(s):
        - LogPassProposal(id,proposals[id].dst,block.timestamp) (Proposal.sol#1382)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3
INFO:Detectors:
Proposal.createProposal(address,string) (Proposal.sol#1317-1339) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(proposals[id].createTime == 0,Proposal already exists) (Proposal.sol#1328)
Proposal.voteProposal(bytes32,bool) (Proposal.sol#1341-1396) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(proposals[id].createTime != 0,Proposal not exist) (Proposal.sol#1346)
        - require(bool,string)(block.timestamp < proposals[id].createTime + proposalLastingPeriod,Proposal expired) (Proposal.s
ol#1351-1354)
        - proposals[id].reject >= validators.getActiveValidators().length / 2 + 1 (Proposal.sol#1388-1389)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#block-timestamp
```

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INFO:Detectors:
Validators.onlyNotRewarded() (Proposal.sol#490-496) compares to a boolean constant:
        -require(bool,string)(operationsDone[block.number][uint8(Operations.Distribute)] == false,Block is already rewarded) (P
roposal.sol#491-494)
Validators.onlyNotUpdated() (Proposal.sol#498-505) compares to a boolean constant:
        -require(bool,string)(operationsDone[block.number][uint8(Operations.UpdateValidators)] == false,Validators already upda
ted) (Proposal.sol#499-503)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#boolean-equality
INFO:Detectors:
SafeMath.mod(uint256,uint256) (Proposal.sol#133-135) is never used and should be removed
SafeMath.mod(uint256,uint256,string) (Proposal.sol#149-156) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code
INFO:Detectors:
Pragma version>=0.6.0<0.8.0 (Proposal.sol#2) is too complex
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity
INFO:Detectors:
Constant Params.ValidatorContractAddr (Proposal.sol#164-165) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.PunishContractAddr (Proposal.sol#166-167) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.ProposalAddr (Proposal.sol#168-169) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MaxValidators (Proposal.sol#172) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.StakingLockPeriod (Proposal.sol#174) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.WithdrawProfitPeriod (Proposal.sol#176) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MinimalStakingCoin (Proposal.sol#177) is not in UPPER_CASE_WITH_UNDERSCORES
Event ValidatorswithdrawStakingRewardEv(address,address,uint256,uint256) (Proposal.sol#488) is not in CapWords
Parameter Validators.setContractCreator(address)._contract (Proposal.sol#510) is not in mixedCase
Parameter Validators.distributeBlockReward(address[],uint64[])._to (Proposal.sol#817) is not in mixedCase
Parameter Validators.distributeBlockReward(address[],uint64[])._gass (Proposal.sol#817) is not in mixedCase
Parameter Validators.viewStakeReward(address,address)._staker (Proposal.sol#1224) is not in mixedCase
Parameter Validators.viewStakeReward(address,address)._validator (Proposal.sol#1224) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions
```

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INFO:Detectors:
Reentrancy in Validators.distributeBlockReward(address[],uint64[]) (Proposal.sol#817-878):
        External calls:
        - address(0).transfer(_burnPart) (Proposal.sol#839)
        State variables written after the call(s):
        - lastRewardTime[val] = block.timestamp (Proposal.sol#858)
        - reflectionPercentSum[val][lastRewardTime[val]] = lastRewardHold + (remaining * 10000000000000000000 / validatorInfo[
val].coins) (Proposal.sol#861)
        - reflectionPercentSum[val][lastRewardTime[val]] = lastRewardHold (Proposal.sol#865)
        - addProfitsToActiveValidatorsByStakePercentExcept(_validatorPart,address(0)) (Proposal.sol#875)
                - validatorInfo[val].hbIncoming = validatorInfo[val].hbIncoming.add(per) (Proposal.sol#1148-1150)
                - validatorInfo[last].hbIncoming = validatorInfo[last].hbIncoming.add(remain) (Proposal.sol#1157-1159)
                - validatorInfo[val_scope_1].hbIncoming = validatorInfo[val_scope_1].hbIncoming.add(reward) (Proposal.sol#1175-
1177)
                - validatorInfo[last].hbIncoming = validatorInfo[last].hbIncoming.add(remain) (Proposal.sol#1183-1185)
        Event emitted after the call(s):
        - LogDistributeBlockReward(val,_validatorPart,block.timestamp,_to,_gass) (Proposal.sol#877)
Reentrancy in Validators.stake(address) (Proposal.sol#550-606):
        External calls:
        - withdrawStakingReward(validator) (Proposal.sol#589)
                - msg.sender.transfer(reward) (Proposal.sol#744)
        State variables written after the call(s):
        - tryAddValidatorToHighestSet(validator,valInfo.coins) (Proposal.sol#596)
                - highestValidatorsSet.push(val) (Proposal.sol#1061)
                - highestValidatorsSet[lowestIndex] = val (Proposal.sol#1087)
        - staked[staker][validator].coins = staked[staker][validator].coins.add(staking) (Proposal.sol#599-601)
        - totalStake = totalStake.add(staking) (Proposal.sol#602)
        - valInfo.coins = valInfo.coins.add(staking) (Proposal.sol#592)
        - valInfo.status = Status.Staked (Proposal.sol#594)
        Event emitted after the call(s):
        - LogAddToTopValidators(val,block.timestamp) (Proposal.sol#1062)
                - tryAddValidatorToHighestSet(validator,valInfo.coins) (Proposal.sol#596)
        - LogAddToTopValidators(val,block.timestamp) (Proposal.sol#1082)
                - tryAddValidatorToHighestSet(validator,valInfo.coins) (Proposal.sol#596)
        - LogRemoveFromTopValidators(highestValidatorsSet[lowestIndex],block.timestamp) (Proposal.sol#1083-1086)
                - tryAddValidatorToHighestSet(validator,valInfo.coins) (Proposal.sol#596)
```

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        - staker.transfer(staking) (Proposal.sol#770)
        Event emitted after the call(s):
        - LogWithdrawStaking(staker,validator,staking,block.timestamp) (Proposal.sol#772)
Reentrancy in Validators.withdrawStakingReward(address) (Proposal.sol#734-748):
        External calls:
        - msg.sender.transfer(reward) (Proposal.sol#744)
        Event emitted after the call(s):
        - withdrawStakingRewardEv(msg.sender,validator,reward,block.timestamp) (Proposal.sol#745)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-4
INFO:Detectors:
Punish.slitherConstructorConstantVariables() (Proposal.sol#218-349) uses literals with too many digits:
        - ValidatorContractAddr = 0x0000000000000000000000000000000000000f000 (Proposal.sol#164-165)
Punish.slitherConstructorConstantVariables() (Proposal.sol#218-349) uses literals with too many digits:
        - PunishContractAddr = 0x0000000000000000000000000000000000000F001 (Proposal.sol#166-167)
Punish.slitherConstructorConstantVariables() (Proposal.sol#218-349) uses literals with too many digits:
        - ProposalAddr = 0x0000000000000000000000000000000000000F002 (Proposal.sol#168-169)
Validators.withdrawStakingReward(address) (Proposal.sol#734-748) uses literals with too many digits:
        - reward = stakingInfo.coins * validPercent / 10000000000000000000 (Proposal.sol#743)
Validators.distributeBlockReward(address[],uint64[]) (Proposal.sol#817-878) uses literals with too many digits:
        - _validatorPart = reward * validatorPartPercent / 100000 (Proposal.sol#830)
Validators.distributeBlockReward(address[],uint64[]) (Proposal.sol#817-878) uses literals with too many digits:
        - _burnPart = reward * burnPartPercent / 100000 (Proposal.sol#834)
Validators.distributeBlockReward(address[],uint64[]) (Proposal.sol#817-878) uses literals with too many digits:
        - amt = amt * contractPartPercent / 100000 (Proposal.sol#850)
Validators.distributeBlockReward(address[],uint64[]) (Proposal.sol#817-878) uses literals with too many digits:
        - reflectionPercentSum[val][lastRewardTime[val]] = lastRewardHold + (remaining * 10000000000000000000 / validatorInfo[
val].coins) (Proposal.sol#861)
Validators.viewStakeReward(address,address) (Proposal.sol#1224-1234) uses literals with too many digits:
        - stakingInfo.coins * validPercent / 10000000000000000000 (Proposal.sol#1230)
Validators.slitherConstructorConstantVariables() (Proposal.sol#352-1235) uses literals with too many digits:
        - ValidatorContractAddr = 0x0000000000000000000000000000000000000f000 (Proposal.sol#164-165)
Validators.slitherConstructorConstantVariables() (Proposal.sol#352-1235) uses literals with too many digits:
        - PunishContractAddr = 0x0000000000000000000000000000000000000F001 (Proposal.sol#166-167)
```

```
Validators.slitherConstructorConstantVariables() (Proposal.sol#352-1235) uses literals with too many digits:
        - ProposalAddr = 0x0000000000000000000000000000000000000F002 (Proposal.sol#168-169)
Proposal.slitherConstructorConstantVariables() (Proposal.sol#1238-1409) uses literals with too many digits:
        - ValidatorContractAddr = 0x0000000000000000000000000000000000000f000 (Proposal.sol#164-165)
Proposal.slitherConstructorConstantVariables() (Proposal.sol#1238-1409) uses literals with too many digits:
        - PunishContractAddr = 0x0000000000000000000000000000000000000F001 (Proposal.sol#166-167)
Proposal.slitherConstructorConstantVariables() (Proposal.sol#1238-1409) uses literals with too many digits:
        - ProposalAddr = 0x0000000000000000000000000000000000000F002 (Proposal.sol#168-169)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits
INFO:Detectors:
cleanPunishRecord(address) should be declared external:
        - Punish.cleanPunishRecord(address) (Proposal.sol#316-340)
getPunishValidatorsLen() should be declared external:
        - Punish.getPunishValidatorsLen() (Proposal.sol#342-344)
getPunishRecord(address) should be declared external:
        - Punish.getPunishRecord(address) (Proposal.sol#346-348)
setContractCreator(address) should be declared external:
        - Validators.setContractCreator(address) (Proposal.sol#510-515)
updateActiveValidatorSet(address[],uint256) should be declared external:
        - Validators.updateActiveValidatorSet(address[],uint256) (Proposal.sol#880-893)
getValidatorDescription(address) should be declared external:
        - Validators.getValidatorDescription(address) (Proposal.sol#916-936)
getValidatorInfo(address) should be declared external:
        - Validators.getValidatorInfo(address) (Proposal.sol#938-962)
getStakingInfo(address,address) should be declared external:
        - Validators.getStakingInfo(address,address) (Proposal.sol#964-978)
getActiveValidators() should be declared external:
        - Validators.getActiveValidators() (Proposal.sol#980-982)
getTotalStakeOfActiveValidators() should be declared external:
        - Validators.getTotalStakeOfActiveValidators() (Proposal.sol#984-990)
getTopValidators() should be declared external:
        - Validators.getTopValidators() (Proposal.sol#1030-1032)
viewStakeReward(address,address) should be declared external:
        - Validators.viewStakeReward(address,address) (Proposal.sol#1224-1234)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external
INFO:Slither:Proposal.sol analyzed (5 contracts with 75 detectors), 74 result(s) found
INFO:Slither:Use https://crytic.io/ to get access to additional detectors and Github integration
```

Slither Log >> Punish.sol

```
INFO:Detectors:
Validators.withdrawStaking(address).staker (Punish.sol#793) lacks a zero-check on :
                - staker.transfer(staking) (Punish.sol#812)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#missing-zero-address-validation
INFO:Detectors:
Validators.distributeBlockReward(address[],uint64[]) (Punish.sol#859-920) has external calls inside a loop: address(contractCre
ator[_to[i]]).transfer(amt) (Punish.sol#893)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation/#calls-inside-a-loop
INFO:Detectors:
Reentrancy in Validators.unstake(address) (Punish.sol#713-774):
        External calls:
        - proposal.setUnpassed(validator) (Punish.sol#766)
        External calls sending eth:
        - withdrawStakingReward(validator) (Punish.sol#769)
                - msg.sender.transfer(reward) (Punish.sol#786)
        State variables written after the call(s):
        - withdrawStakingReward(validator) (Punish.sol#769)
                - stakeTime[msg.sender][validator] = lastRewardTime[validator] (Punish.sol#784)
        - stakeTime[staker][validator] = 0 (Punish.sol#770)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-2
INFO:Detectors:
Reentrancy in Punish.punish(address) (Punish.sol#1320-1345):
        External calls:
        - validators.removeValidator(val) (Punish.sol#1335)
        - validators.removeValidatorIncoming(val) (Punish.sol#1341)
        Event emitted after the call(s):
        - LogPunishValidator(val,block.timestamp) (Punish.sol#1344)
Reentrancy in Validators.removeValidator(address) (Punish.sol#937-952):
        External calls:
        - proposal.setUnpassed(val) (Punish.sol#949)
        Event emitted after the call(s):
        - LogRemoveValidator(val,hb,block.timestamp) (Punish.sol#950)
Reentrancy in Validators.tryReactive(address) (Punish.sol#691-711):
        External calls:
        - require(bool,string)(punish.cleanPunishRecord(validator),clean failed) (Punish.sol#706)
```

```
Reentrancy in Validators.unstake(address) (Punish.sol#713-774):
        External calls:
        - proposal.setUnpassed(validator) (Punish.sol#766)
        External calls sending eth:
        - withdrawStakingReward(validator) (Punish.sol#769)
                - msg.sender.transfer(reward) (Punish.sol#786)
        Event emitted after the call(s):
        - LogUnstake(staker,validator,unstakeAmount,block.timestamp) (Punish.sol#772)
        - withdrawStakingRewardEv(msg.sender,validator,reward,block.timestamp) (Punish.sol#787)
                - withdrawStakingReward(validator) (Punish.sol#769)
Reentrancy in Proposal.voteProposal(bytes32,bool) (Punish.sol#323-378):
        External calls:
        - validators.tryReactive(proposals[id].dst) (Punish.sol#363)
        Event emitted after the call(s):
        - LogPassProposal(id,proposals[id].dst,block.timestamp) (Punish.sol#364)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3
INFO:Detectors:
Proposal.createProposal(address,string) (Punish.sol#299-321) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(proposals[id].createTime == 0,Proposal already exists) (Punish.sol#310)
Proposal.voteProposal(bytes32,bool) (Punish.sol#323-378) uses timestamp for comparisons
        Dangerous comparisons:
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        - proposals[id].reject >= validators.getActiveValidators().length / 2 + 1 (Punish.sol#370-371)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#block-timestamp
INFO:Detectors:
Validators.onlyNotRewarded() (Punish.sol#532-538) compares to a boolean constant:
        -require(bool,string)(operationsDone[block.number][uint8(Operations.Distribute)] == false,Block is already rewarded) (P
unish.sol#533-536)
Validators.onlyNotUpdated() (Punish.sol#540-547) compares to a boolean constant:
        -require(bool,string)(operationsDone[block.number][uint8(Operations.UpdateValidators)] == false,Validators already upda
ted) (Punish.sol#541-545)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#boolean-equality
INFO:Detectors:
SafeMath.mod(uint256,uint256) (Punish.sol#135-137) is never used and should be removed
SafeMath.mod(uint256,uint256,string) (Punish.sol#151-158) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code
INFO:Detectors:
Pragma version>=0.6.0<0.8.0 (Punish.sol#2) is too complex
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity
INFO:Detectors:
Constant Params.ValidatorContractAddr (Punish.sol#165-166) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.PunishContractAddr (Punish.sol#167-168) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.ProposalAddr (Punish.sol#169-170) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MaxValidators (Punish.sol#173) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.StakingLockPeriod (Punish.sol#175) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.WithdrawProfitPeriod (Punish.sol#177) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MinimalStakingCoin (Punish.sol#178) is not in UPPER_CASE_WITH_UNDERSCORES
Event ValidatorswithdrawStakingRewardEv(address,address,uint256,uint256) (Punish.sol#530) is not in CapWords
Parameter Validators.setContractCreator(address)._contract (Punish.sol#552) is not in mixedCase
Parameter Validators.distributeBlockReward(address[],uint64[])._to (Punish.sol#859) is not in mixedCase
Parameter Validators.distributeBlockReward(address[],uint64[])._gass (Punish.sol#859) is not in mixedCase
Parameter Validators.viewStakeReward(address,address)._staker (Punish.sol#1266) is not in mixedCase
Parameter Validators.viewStakeReward(address,address)._validator (Punish.sol#1266) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions
```

```
INFO:Detectors:
Proposal.slitherConstructorConstantVariables() (Punish.sol#220-391) uses literals with too many digits:
        - ValidatorContractAddr = 0x000000000000000000000000000000000000f000 (Punish.sol#165-166)
Proposal.slitherConstructorConstantVariables() (Punish.sol#220-391) uses literals with too many digits:
        - PunishContractAddr = 0x000000000000000000000000000000000000F001 (Punish.sol#167-168)
Proposal.slitherConstructorConstantVariables() (Punish.sol#220-391) uses literals with too many digits:
        - ProposalAddr = 0x000000000000000000000000000000000000F002 (Punish.sol#169-170)
Validators.withdrawStakingReward(address) (Punish.sol#776-790) uses literals with too many digits:
        - reward = stakingInfo.coins * validPercent / 10000000000000000000 (Punish.sol#785)
Validators.distributeBlockReward(address[],uint64[]) (Punish.sol#859-920) uses literals with too many digits:
        - _validatorPart = reward * validatorPartPercent / 100000 (Punish.sol#872)
Validators.distributeBlockReward(address[],uint64[]) (Punish.sol#859-920) uses literals with too many digits:
        - _burnPart = reward * burnPartPercent / 100000 (Punish.sol#876)
Validators.distributeBlockReward(address[],uint64[]) (Punish.sol#859-920) uses literals with too many digits:
        - amt = amt * contractPartPercent / 100000 (Punish.sol#892)
Validators.distributeBlockReward(address[],uint64[]) (Punish.sol#859-920) uses literals with too many digits:
        - reflectionPercentSum[val][lastRewardTime[val]] = lastRewardHold + (remaining * 10000000000000000000 / validatorInfo[
val].coins) (Punish.sol#903)
Validators.viewStakeReward(address,address) (Punish.sol#1266-1276) uses literals with too many digits:
        - stakingInfo.coins * validPercent / 10000000000000000000 (Punish.sol#1272)
Validators.slitherConstructorConstantVariables() (Punish.sol#394-1277) uses literals with too many digits:
        - ValidatorContractAddr = 0x000000000000000000000000000000000000f000 (Punish.sol#165-166)
Validators.slitherConstructorConstantVariables() (Punish.sol#394-1277) uses literals with too many digits:
        - PunishContractAddr = 0x000000000000000000000000000000000000F001 (Punish.sol#167-168)
Validators.slitherConstructorConstantVariables() (Punish.sol#394-1277) uses literals with too many digits:
        - ProposalAddr = 0x000000000000000000000000000000000000F002 (Punish.sol#169-170)
Punish.slitherConstructorConstantVariables() (Punish.sol#1279-1410) uses literals with too many digits:
        - ValidatorContractAddr = 0x000000000000000000000000000000000000f000 (Punish.sol#165-166)
Punish.slitherConstructorConstantVariables() (Punish.sol#1279-1410) uses literals with too many digits:
        - PunishContractAddr = 0x000000000000000000000000000000000000F001 (Punish.sol#167-168)
Punish.slitherConstructorConstantVariables() (Punish.sol#1279-1410) uses literals with too many digits:
        - ProposalAddr = 0x000000000000000000000000000000000000F002 (Punish.sol#169-170)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits
```

```
INFO:Detectors:
setContractCreator(address) should be declared external:
        - Validators.setContractCreator(address) (Punish.sol#552-557)
updateActiveValidatorSet(address[],uint256) should be declared external:
        - Validators.updateActiveValidatorSet(address[],uint256) (Punish.sol#922-935)
getValidatorDescription(address) should be declared external:
        - Validators.getValidatorDescription(address) (Punish.sol#958-978)
getValidatorInfo(address) should be declared external:
        - Validators.getValidatorInfo(address) (Punish.sol#980-1004)
getStakingInfo(address,address) should be declared external:
        - Validators.getStakingInfo(address,address) (Punish.sol#1006-1020)
getActiveValidators() should be declared external:
        - Validators.getActiveValidators() (Punish.sol#1022-1024)
getTotalStakeOfActiveValidators() should be declared external:
        - Validators.getTotalStakeOfActiveValidators() (Punish.sol#1026-1032)
getTopValidators() should be declared external:
        - Validators.getTopValidators() (Punish.sol#1072-1074)
viewStakeReward(address,address) should be declared external:
        - Validators.viewStakeReward(address,address) (Punish.sol#1266-1276)
cleanPunishRecord(address) should be declared external:
        - Punish.cleanPunishRecord(address) (Punish.sol#1377-1401)
getPunishValidatorsLen() should be declared external:
        - Punish.getPunishValidatorsLen() (Punish.sol#1403-1405)
getPunishRecord(address) should be declared external:
        - Punish.getPunishRecord(address) (Punish.sol#1407-1409)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external
INFO:Slither:Punish.sol analyzed (5 contracts with 75 detectors), 74 result(s) found
INFO:Slither:Use https://crytic.io/ to get access to additional detectors and Github integration
```

Slither Log >> Validators.sol

```
INFO:Detectors:
Validators.withdrawStaking(address).staker (Validators.sol#926) lacks a zero-check on :
                - staker.transfer(staking) (Validators.sol#945)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#missing-zero-address-validation
INFO:Detectors:
Validators.distributeBlockReward(address[],uint64[]) (Validators.sol#992-1053) has external calls inside a loop: address(contra
ctCreator[_to[i]]).transfer(amt) (Validators.sol#1026)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation/#calls-inside-a-loop
INFO:Detectors:
Reentrancy in Validators.unstake(address) (Validators.sol#846-907):
        External calls:
        - proposal.setUnpassed(validator) (Validators.sol#899)
        External calls sending eth:
        - withdrawStakingReward(validator) (Validators.sol#902)
                - msg.sender.transfer(reward) (Validators.sol#919)
        State variables written after the call(s):
        - withdrawStakingReward(validator) (Validators.sol#902)
                - stakeTime[msg.sender][validator] = lastRewardTime[validator] (Validators.sol#917)
        - stakeTime[staker][validator] = 0 (Validators.sol#903)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-2
INFO:Detectors:
Reentrancy in Punish.punish(address) (Validators.sol#435-460):
        External calls:
        - validators.removeValidator(val) (Validators.sol#450)
        - validators.removeValidatorIncoming(val) (Validators.sol#456)
        Event emitted after the call(s):
        - LogPunishValidator(val,block.timestamp) (Validators.sol#459)
Reentrancy in Validators.removeValidator(address) (Validators.sol#1070-1085):
        External calls:
        - proposal.setUnpassed(val) (Validators.sol#1082)
        Event emitted after the call(s):
        - LogRemoveValidator(val,hb,block.timestamp) (Validators.sol#1083)
Reentrancy in Validators.tryReactive(address) (Validators.sol#824-844):
        External calls:
        - require(bool,string)(punish.cleanPunishRecord(validator),clean failed) (Validators.sol#839)
```

```
Reentrancy in Validators.unstake(address) (Validators.sol#846-907):
        External calls:
        - proposal.setUnpassed(validator) (Validators.sol#899)
        External calls sending eth:
        - withdrawStakingReward(validator) (Validators.sol#902)
                - msg.sender.transfer(reward) (Validators.sol#919)
        Event emitted after the call(s):
        - LogUnstake(staker,validator,unstakeAmount,block.timestamp) (Validators.sol#905)
        - withdrawStakingRewardEv(msg.sender,validator,reward,block.timestamp) (Validators.sol#920)
                - withdrawStakingReward(validator) (Validators.sol#902)
Reentrancy in Proposal.voteProposal(bytes32,bool) (Validators.sol#323-378):
        External calls:
        - validators.tryReactive(proposals[id].dst) (Validators.sol#363)
        Event emitted after the call(s):
        - LogPassProposal(id,proposals[id].dst,block.timestamp) (Validators.sol#364)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3
INFO:Detectors:
Proposal.createProposal(address,string) (Validators.sol#299-321) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(proposals[id].createTime == 0,Proposal already exists) (Validators.sol#310)
Proposal.voteProposal(bytes32,bool) (Validators.sol#323-378) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(proposals[id].createTime != 0,Proposal not exist) (Validators.sol#328)
        - require(bool,string)(block.timestamp < proposals[id].createTime + proposalLastingPeriod,Proposal expired) (Validators
.sol#333-336)
        - proposals[id].reject >= validators.getActiveValidators().length / 2 + 1 (Validators.sol#370-371)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#block-timestamp
INFO:Detectors:
Validators.onlyNotRewarded() (Validators.sol#665-671) compares to a boolean constant:
        -require(bool,string)(operationsDone[block.number][uint8(Operations.Distribute)] == false,Block is already rewarded) (V
alidators.sol#666-669)
Validators.onlyNotUpdated() (Validators.sol#673-680) compares to a boolean constant:
        -require(bool,string)(operationsDone[block.number][uint8(Operations.UpdateValidators)] == false,Validators already upda
ted) (Validators.sol#674-678)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#boolean-equality
```

```
INFO:Detectors:
SafeMath.mod(uint256,uint256) (Validators.sol#134-136) is never used and should be removed
SafeMath.mod(uint256,uint256,string) (Validators.sol#150-157) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code
INFO:Detectors:
Pragma version>=0.6.0<0.8.0 (Validators.sol#2) is too complex
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity
INFO:Detectors:
Constant Params.ValidatorContractAddr (Validators.sol#165-166) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.PunishContractAddr (Validators.sol#167-168) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.ProposalAddr (Validators.sol#169-170) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MaxValidators (Validators.sol#173) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.StakingLockPeriod (Validators.sol#175) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.WithdrawProfitPeriod (Validators.sol#177) is not in UPPER_CASE_WITH_UNDERSCORES
Constant Params.MinimalStakingCoin (Validators.sol#178) is not in UPPER_CASE_WITH_UNDERSCORES
Event ValidatorswithdrawStakingRewardEv(address,address,uint256,uint256) (Validators.sol#663) is not in CapWords
Parameter Validators.setContractCreator(address)._contract (Validators.sol#685) is not in mixedCase
Parameter Validators.distributeBlockReward(address[],uint64[])._to (Validators.sol#992) is not in mixedCase
Parameter Validators.distributeBlockReward(address[],uint64[])._gass (Validators.sol#992) is not in mixedCase
Parameter Validators.viewStakeReward(address,address)._staker (Validators.sol#1399) is not in mixedCase
Parameter Validators.viewStakeReward(address,address)._validator (Validators.sol#1399) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions
INFO:Detectors:
Reentrancy in Validators.distributeBlockReward(address[],uint64[]) (Validators.sol#992-1053):
        External calls:
        - address(0).transfer(_burnPart) (Validators.sol#1014)
        State variables written after the call(s):
        - lastRewardTime[val] = block.timestamp (Validators.sol#1033)
        - reflectionPercentSum[val][lastRewardTime[val]] = lastRewardHold + (remaining * 10000000000000000000 / validatorInfo[
val].coins) (Validators.sol#1036)
```

```
        - reflectionPercentSum[val][lastRewardTime[val]] = lastRewardHold (Validators.sol#1040)
        - addProfitsToActiveValidatorsByStakePercentExcept(_validatorPart,address(0)) (Validators.sol#1050)
                - validatorInfo[val].hbIncoming = validatorInfo[val].hbIncoming.add(per) (Validators.sol#1323-1325)
                - validatorInfo[last].hbIncoming = validatorInfo[last].hbIncoming.add(remain) (Validators.sol#1332-1334)
                - validatorInfo[val_scope_1].hbIncoming = validatorInfo[val_scope_1].hbIncoming.add(reward) (Validators.sol#135
0-1352)
                - validatorInfo[last].hbIncoming = validatorInfo[last].hbIncoming.add(remain) (Validators.sol#1358-1360)
        Event emitted after the call(s):
        - LogDistributeBlockReward(val,_validatorPart,block.timestamp,_to,_gass) (Validators.sol#1052)
Reentrancy in Validators.stake(address) (Validators.sol#725-781):
        External calls:
        - withdrawStakingReward(validator) (Validators.sol#764)
                - msg.sender.transfer(reward) (Validators.sol#919)
        State variables written after the call(s):
        - tryAddValidatorToHighestSet(validator,valInfo.coins) (Validators.sol#771)
                - highestValidatorsSet.push(val) (Validators.sol#1236)
                - highestValidatorsSet[lowestIndex] = val (Validators.sol#1262)
        - staked[staker][validator].coins = staked[staker][validator].coins.add(staking) (Validators.sol#774-776)
        - totalStake = totalStake.add(staking) (Validators.sol#777)
        - valInfo.coins = valInfo.coins.add(staking) (Validators.sol#767)
        - valInfo.status = Status.Staked (Validators.sol#769)
        Event emitted after the call(s):
        - LogAddToTopValidators(val,block.timestamp) (Validators.sol#1237)
                - tryAddValidatorToHighestSet(validator,valInfo.coins) (Validators.sol#771)
        - LogAddToTopValidators(val,block.timestamp) (Validators.sol#1257)
                - tryAddValidatorToHighestSet(validator,valInfo.coins) (Validators.sol#771)
        - LogRemoveFromTopValidators(highestValidatorsSet[lowestIndex],block.timestamp) (Validators.sol#1258-1261)
                - tryAddValidatorToHighestSet(validator,valInfo.coins) (Validators.sol#771)
        - LogStake(staker,validator,staking,block.timestamp) (Validators.sol#779)
Reentrancy in Validators.unstake(address) (Validators.sol#846-907):
        External calls:
        - withdrawStakingReward(validator) (Validators.sol#902)
                - msg.sender.transfer(reward) (Validators.sol#919)
        State variables written after the call(s):
        - stakeTime[staker][validator] = 0 (Validators.sol#903)
        Event emitted after the call(s):
        - LogUnstake(staker,validator,unstakeAmount,block.timestamp) (Validators.sol#905)
```

```
Reentrancy in Validators.withdrawStakingReward(address) (Validators.sol#909-923):
        External calls:
        - msg.sender.transfer(reward) (Validators.sol#919)
        Event emitted after the call(s):
        - withdrawStakingRewardEv(msg.sender,validator,reward,block.timestamp) (Validators.sol#920)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-4
INFO:Detectors:
Proposal.slitherConstructorConstantVariables() (Validators.sol#220-391) uses literals with too many digits:
        - ValidatorContractAddr = 0x000000000000000000000000000000000000f000 (Validators.sol#165-166)
Proposal.slitherConstructorConstantVariables() (Validators.sol#220-391) uses literals with too many digits:
        - PunishContractAddr = 0x000000000000000000000000000000000000F001 (Validators.sol#167-168)
Proposal.slitherConstructorConstantVariables() (Validators.sol#220-391) uses literals with too many digits:
        - ProposalAddr = 0x000000000000000000000000000000000000F002 (Validators.sol#169-170)
Punish.slitherConstructorConstantVariables() (Validators.sol#394-525) uses literals with too many digits:
        - ValidatorContractAddr = 0x000000000000000000000000000000000000f000 (Validators.sol#165-166)
Punish.slitherConstructorConstantVariables() (Validators.sol#394-525) uses literals with too many digits:
        - PunishContractAddr = 0x000000000000000000000000000000000000F001 (Validators.sol#167-168)
Punish.slitherConstructorConstantVariables() (Validators.sol#394-525) uses literals with too many digits:
        - ProposalAddr = 0x000000000000000000000000000000000000F002 (Validators.sol#169-170)
Validators.withdrawStakingReward(address) (Validators.sol#909-923) uses literals with too many digits:
        - reward = stakingInfo.coins * validPercent / 10000000000000000000 (Validators.sol#918)
Validators.distributeBlockReward(address[],uint64[]) (Validators.sol#992-1053) uses literals with too many digits:
        - _validatorPart = reward * validatorPartPercent / 100000 (Validators.sol#1005)
Validators.distributeBlockReward(address[],uint64[]) (Validators.sol#992-1053) uses literals with too many digits:
        - _burnPart = reward * burnPartPercent / 100000 (Validators.sol#1009)
Validators.distributeBlockReward(address[],uint64[]) (Validators.sol#992-1053) uses literals with too many digits:
        - amt = amt * contractPartPercent / 100000 (Validators.sol#1025)
```

```
Validators.slitherConstructorConstantVariables() (Validators.sol#527-1410) uses literals with too many digits:
        - ValidatorContractAddr = 0x000000000000000000000000000000000000f000 (Validators.sol#165-166)
Validators.slitherConstructorConstantVariables() (Validators.sol#527-1410) uses literals with too many digits:
        - PunishContractAddr = 0x000000000000000000000000000000000000F001 (Validators.sol#167-168)
Validators.slitherConstructorConstantVariables() (Validators.sol#527-1410) uses literals with too many digits:
        - ProposalAddr = 0x000000000000000000000000000000000000F002 (Validators.sol#169-170)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits
INFO:Detectors:
cleanPunishRecord(address) should be declared external:
        - Punish.cleanPunishRecord(address) (Validators.sol#492-516)
getPunishValidatorsLen() should be declared external:
        - Punish.getPunishValidatorsLen() (Validators.sol#518-520)
getPunishRecord(address) should be declared external:
        - Punish.getPunishRecord(address) (Validators.sol#522-524)
setContractCreator(address) should be declared external:
        - Validators.setContractCreator(address) (Validators.sol#685-690)
updateActiveValidatorSet(address[],uint256) should be declared external:
        - Validators.updateActiveValidatorSet(address[],uint256) (Validators.sol#1055-1068)
getValidatorDescription(address) should be declared external:
        - Validators.getValidatorDescription(address) (Validators.sol#1091-1111)
getValidatorInfo(address) should be declared external:
        - Validators.getValidatorInfo(address) (Validators.sol#1113-1137)
getStakingInfo(address,address) should be declared external:
        - Validators.getStakingInfo(address,address) (Validators.sol#1139-1153)
getActiveValidators() should be declared external:
        - Validators.getActiveValidators() (Validators.sol#1155-1157)
getTotalStakeOfActiveValidators() should be declared external:
        - Validators.getTotalStakeOfActiveValidators() (Validators.sol#1159-1165)
getTopValidators() should be declared external:
        - Validators.getTopValidators() (Validators.sol#1205-1207)
viewStakeReward(address,address) should be declared external:
        - Validators.viewStakeReward(address,address) (Validators.sol#1399-1409)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external
INFO:Slither:Validators.sol analyzed (5 contracts with 75 detectors), 74 result(s) found
INFO:Slither:Use https://crytic.io/ to get access to additional detectors and Github integration
```

Solidity Static Analysis

Params.sol

Miscellaneous

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.
more
Pos: 24:8:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.
more
Pos: 29:8:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.
more
Pos: 44:8:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.
more
Pos: 49:8:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.
more
Pos: 57:8:

Proposal.sol

Security

Transaction origin:

Use of tx.origin: "tx.origin" is useful only in very exceptional cases. If you use it for authentication, you usually want to replace it by "msg.sender", because otherwise any contract you call can act on your behalf.
more
Pos: 171:37:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 769:49:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 875:53:

Gas & Economy

Gas costs:

Gas requirement of function Proposal.initialize is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 74:4:

Gas costs:

Gas requirement of function Validators.initialize is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 74:4:

Gas costs:

Gas requirement of function Proposal.initialize is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 175:4:

Gas costs:

Gas requirement of function Validators.stake is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 208:4:

Gas costs:

Gas requirement of function Validators.unstake is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 329:4:

Gas costs:

Gas requirement of function Validators.distributeBlockReward is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 475:4:

Gas costs:

Gas requirement of function Validators.isActiveValidator is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 668:4:

Gas costs:

Gas requirement of function Validators.isTopValidator is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 678:4:

Gas costs:

Gas requirement of function Validators.getTopValidators is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 688:4:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.
more
Pos: 116:8:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.
more
Pos: 679:8:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.
more
Pos: 869:16:

Miscellaneous

Similar variable names:

Validators.viewStakeReward(address,address) : Variables have very similar names "staked" and "_staker". Note: Modifiers are currently not considered by this static analysis.
Pos: 884:134:

Similar variable names:

Validators.viewStakeReward(address,address) : Variables have very similar names "staked" and "_staker". Note: Modifiers are currently not considered by this static analysis.
Pos: 887:45:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.
more
Pos: 701:8:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.
more
Pos: 702:8:

Data truncated:

Division of integer values yields an integer value again. That means e.g. 10 / 100 = 0 instead of 0.1 since the result is an integer again. This does not hold for division of (only) literal values since those yield rational constants.
Pos: 519:79:

Data truncated:

Division of integer values yields an integer value again. That means e.g. 10 / 100 = 0 instead of 0.1 since the result is an integer again. This does not hold for division of (only) literal values since those yield rational constants.
Pos: 888:19:

Punish.sol

Security

Transaction origin:

Use of tx.origin: "tx.origin" is useful only in very exceptional cases. If you use it for authentication, you usually want to replace it by "msg.sender", because otherwise any contract you call can act on your behalf.
more
Pos: 171:37:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 94:55:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 175:33:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 326:36:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 875:53:

Gas & Economy

Gas costs:

Gas requirement of function Proposal.initialize is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 74:4:

Gas costs:

Gas requirement of function Validators.initialize is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 74:4:

Gas costs:

Gas requirement of function Punish.decreaseMissedBlocksCounter is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 75:4:

Gas costs:

Gas requirement of function Validators.distributeBlockReward is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 475:4:

Gas costs:

Gas requirement of function Validators.getTotalStakeOfActiveValidators is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 642:4:

Gas costs:

Gas requirement of function Validators.isActiveValidator is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 668:4:

Gas costs:

Gas requirement of function Validators.isTopValidator is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 678:4:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.
more
Pos: 800:12:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.

more

Pos: 823:8:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.

more

Pos: 869:16:

Miscellaneous

Similar variable names:

Validators.viewStakeReward(address,address) : Variables have very similar names "staked" and "_staker". Note: Modifiers are currently not considered by this static analysis.

Pos: 887:45:

Similar variable names:

Validators.viewStakeReward(address,address) : Variables have very similar names "staked" and "_staker". Note: Modifiers are currently not considered by this static analysis.

Pos: 887:52:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.

more

Pos: 701:8:

Data truncated:

Division of integer values yields an integer value again. That means e.g. 10 / 100 = 0 instead of 0.1 since the result is an integer again. This does not hold for division of (only) literal values since those yield rational constants.
Pos: 888:19:

Validators.sol

Security

Transaction origin:

Use of tx.origin: "tx.origin" is useful only in very exceptional cases. If you use it for authentication, you usually want to replace it by "msg.sender", because otherwise any contract you call can act on your behalf.
more
Pos: 171:37:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 769:49:

Block timestamp:

Use of "block.timestamp": "block.timestamp" can be influenced by miners to a certain degree. That means that a miner can "choose" the block.timestamp, to a certain degree, to change the outcome of a transaction in the mined block.
more
Pos: 875:53:

Gas & Economy

Gas costs:

Gas requirement of function Proposal.initialize is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 74:4:

Gas costs:

Gas requirement of function Validators.isTopValidator is infinite: If the gas requirement of a function is higher than the block gas limit, it cannot be executed. Please avoid loops in your functions or actions that modify large areas of storage (this includes clearing or copying arrays in storage)
Pos: 678:4:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.

more

Pos: 727:8:

For loop over dynamic array:

Loops that do not have a fixed number of iterations, for example, loops that depend on storage values, have to be used carefully. Due to the block gas limit, transactions can only consume a certain amount of gas. The number of iterations in a loop can grow beyond the block gas limit which can cause the complete contract to be stalled at a certain point. Additionally, using unbounded loops incurs in a lot of avoidable gas costs. Carefully test how many items at maximum you can pass to such functions to make it successful.

more

Pos: 869:16:

Miscellaneous

Similar variable names:

Validators.viewStakeReward(address,address) : Variables have very similar names "staked" and "_staker". Note: Modifiers are currently not considered by this static analysis.

Pos: 887:52:

Guard conditions:

Use "assert(x)" if you never ever want x to be false, not in any circumstance (apart from a bug in your code). Use "require(x)" if x can be false, due to e.g. invalid input or a failing external component.

more

Pos: 703:8:

Data truncated:

Division of integer values yields an integer value again. That means e.g. 10 / 100 = 0 instead of 0.1 since the result is an integer again. This does not hold for division of (only) literal values since those yield rational constants.

Pos: 888:19:

Solhint Linter

Params.sol

```
Params.sol:2:1: Error: Compiler version >=0.6.0 <0.8.0 does not
satisfy the r semver requirement
Params.sol:9:25: Error: Constant name must be in capitalized
SNAKE_CASE
Params.sol:11:25: Error: Constant name must be in capitalized
SNAKE_CASE
Params.sol:13:25: Error: Constant name must be in capitalized
SNAKE_CASE
Params.sol:16:28: Error: Constant name must be in capitalized
SNAKE_CASE
Params.sol:18:28: Error: Constant name must be in capitalized
SNAKE_CASE
Params.sol:20:28: Error: Constant name must be in capitalized
SNAKE_CASE
Params.sol:21:29: Error: Constant name must be in capitalized
SNAKE_CASE
```

Proposal.sol

```
Proposal.sol:2:1: Error: Compiler version >=0.6.0 <0.8.0 does not
satisfy the r semver requirement
Proposal.sol:43:5: Error: Explicitly mark visibility of state
Proposal.sol:94:56: Error: Avoid to make time-based decisions in your
business logic
Proposal.sol:103:31: Error: Avoid to make time-based decisions in
your business logic
Proposal.sol:106:53: Error: Avoid to make time-based decisions in
your business logic
Proposal.sol:121:13: Error: Avoid to make time-based decisions in
your business logic
Proposal.sol:125:42: Error: Avoid to make time-based decisions in
your business logic
Proposal.sol:128:44: Error: Avoid to make time-based decisions in
your business logic
Proposal.sol:151:57: Error: Avoid to make time-based decisions in
your business logic
Proposal.sol:161:59: Error: Avoid to make time-based decisions in
your business logic
Proposal.sol:175:34: Error: Avoid to make time-based decisions in
your business logic
```

Punish.sol

```
Punish.sol:2:1: Error: Compiler version >=0.6.0 <0.8.0 does not
satisfy the r semver requirement
Punish.sol:18:5: Error: Explicitly mark visibility of state
Punish.sol:20:5: Error: Explicitly mark visibility of state
Punish.sol:23:5: Error: Explicitly mark visibility of state
Punish.sol:24:5: Error: Explicitly mark visibility of state
Punish.sol:72:38: Error: Avoid to make time-based decisions in your
business logic
```

Validators.sol

```
Validators.sol:3:1: Error: Compiler version >=0.6.0 <0.8.0 does not
satisfy the r semver requirement
Validators.sol:10:1: Error: Contract has 19 states declarations but
allowed no more than 15
Validators.sol:55:5: Error: Explicitly mark visibility of state
Validators.sol:57:5: Error: Explicitly mark visibility of state
Validators.sol:87:5: Error: Explicitly mark visibility of state
Validators.sol:88:5: Error: Explicitly mark visibility of state
Validators.sol:92:5: Error: Explicitly mark visibility of state
Validators.sol:135:9: Error: Variable name must be in mixedCase
Validators.sol:136:9: Error: Variable name must be in mixedCase
Validators.sol:146:5: Error: Event name must be in CamelCase
Validators.sol:171:38: Error: Avoid to use tx.origin
Validators.sol:181:39: Error: Avoid to make time-based decisions in
your business logic
Validators.sol:262:51: Error: Avoid to make time-based decisions in
your business logic
Validators.sol:519:13: Error: Possible reentrancy vulnerabilities.
Avoid state changes after transfer.
Validators.sol:523:13: Error: Possible reentrancy vulnerabilities.
Avoid state changes after transfer.
Validators.sol:535:60: Error: Avoid to make time-based decisions in
your business logic
Validators.sol:566:46: Error: Avoid to make time-based decisions in
your business logic
Validators.sol:875:54: Error: Avoid to make time-based decisions in
your business logic
```

Software analysis result:

These software reported many false positive results and some are informational issues. So, those issues can be safely ignored.

Email: audit@EtherAuthority.io