BlockÂpex

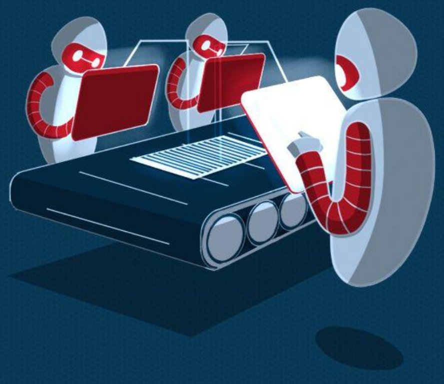
SMART CONTRACT SECURITY ANALYSIS REPORT

```
pragma solidity 0.7.0;
contract Contract {

    function hello() public returns (string) {
        return "Hello World!";
    }

    function findVulnerability() public returns (string) {
        return "Finding Vulnerability";
    }

    function solveVulnerability() public returns (string) {
        return "Solve Vulnerability";
    }
}
```



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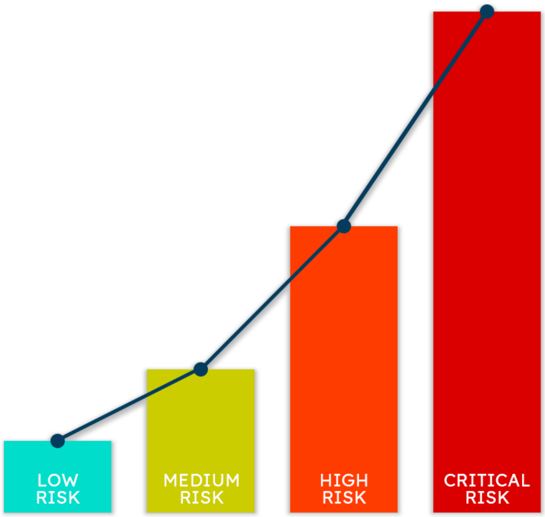
PREFACE

Objectives

The purpose of this document is to highlight the identified bugs/issues in the provided codebase. This audit has been conducted in a closed and secure environment, free from influence or bias of any sort. This document may contain confidential information about IT systems/architecture and intellectual property of the client. It also contains information about potential risks and the processes involved in mitigating/exploiting the risks mentioned below.

The usage of information provided in this report is limited, internally, to the client. However, this report can be disclosed publicly with the intention to aid our growing blockchain community; under the discretion of the client.

Key Understandings



CRITICAL RISK xxxx	Critical vulnerabilities are too easy to exploit and can lead to damages/loss in assets or manipulations.
HIGH RISK xxx	High-level vulnerabilities are difficult to exploit; however, they also have a significant impact on smart contract execution.
MEDIUM RISK xx	Medium-level vulnerabilities are equally imperative to fix but they tend to have minimal impact on asset loss or data manipulations.
LOW RISK x	Lowest-level vulnerabilities, informational errors, violating code styles/practices usually can't affect smart contract execution; hence they can be ignored.

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INTRODUCTION

BlockApex (Auditor) was contracted by Dafi (Client) for the purpose of conducting a Smart Contract Audit/Code Review. This document presents the findings of our analysis which took place on 5th July 2021.

Name
Dafi
Auditor
Moazzam Arif | Shakeib Shaida
Platform
Ethereum/Solidity
Type of review
Super-staking with Rebasing
Methods
Architecture Review, Functional Testing, Computer-Aided Verification, Manual Review
Git Repository
(zip files provided)
White paper/Documentation
https://docs.dafiprotocol.io/
Document log
Initial Audit: 05th July 2021
Final Audit: 4th August 2021

Scope

The git-repository shared was checked for common code violations along with vulnerability-specific probing to detect major issues/vulnerabilities. Some specific checks are as follows:

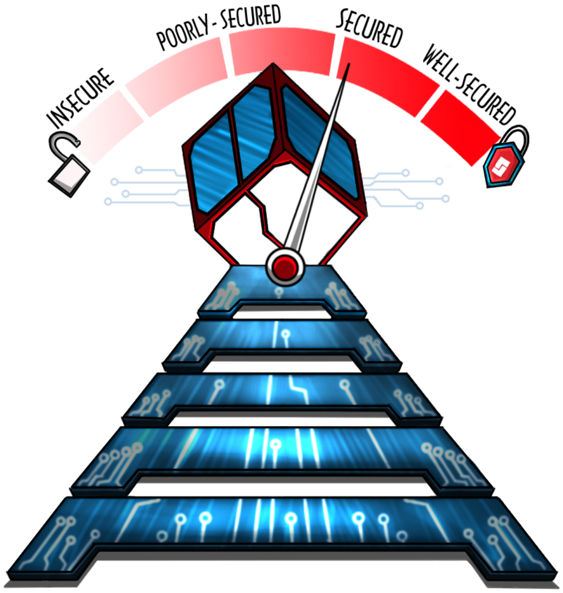
Code review		Functional review
Reentrancy	Unchecked external call	Business Logics Review
Ownership Takeover	ERC20 API violation	Functionality Checks
Timestamp Dependence	Unchecked math	Access Control & Authorization
Gas Limit and Loops	Unsafe type inference	Escrow manipulation
DoS with (Unexpected) Throw	Implicit visibility level	Token Supply manipulation
DoS with Block Gas Limit	Deployment Consistency	Asset's integrity
Transaction-Ordering Dependence	Repository Consistency	User Balances manipulation
Style guide violation	Data Consistency	Kill-Switch Mechanism
Costly Loop		Operation Trails & Event Generation

AUDIT REPORT

Executive Summary

The analysis indicates that the contracts audited are **secured (with a few financial scalability issues).**

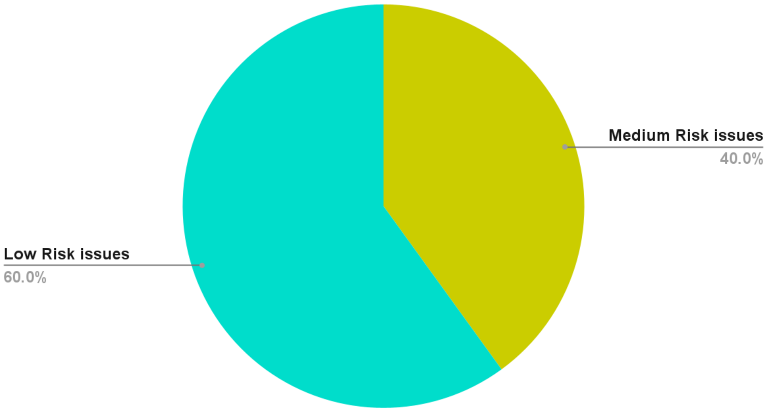
Our team performed a technique called **“Filtered Audit”**, where the contract was separately audited by two individuals. After their thorough and rigorous process of manual testing, an automated review was carried out using Mythril, MythX and Slither. All the flags raised were manually reviewed and re-tested.



Our team found:

# of issues	Severity of the risk
0	Critical Risk issue(s)
0	High Risk issue(s)
2	Medium Risk issue(s)
3	Low Risk issue(s)
0	Informatory issues(s)

Proportion of Vulnerabilities



Findings

Critical-risk issues

No issues found.

High-risk issues

No High risk issues were found.

Medium-risk issues

1. **Rebasing and Reward Distribution Formula is flawed**

File: RebaseEngine.sol

Distribution per second is calculated abnormally

In the following lines:-

```
uint poolCurrent = ((MAX_DAFI - dDAFIDistributed + feesDeposited) *
demandFactorNew);

uint distributePerSecond = poolCurrent /
database.getProgramDuration(); // the remaining pools is divided by
the whole program duration
```

Remedy:

There needs to be an extensive discussion on how the current formula and financial model works, only then a revised version can be created.

Update (Aug 4th 2021):

We are working out the formula with the Dafi team. It's not finalized yet. Once ready, we will share that too.

2. Malicious whitelisted account can withdraw all staked token

File: TokenPool.sol

In function `transfer(address to, uint256 value)` malicious whitelisted accounts can withdraw all tokens in the contract

Remedy:

As transfer function is only used in staking, only StakingManger should have access to this control. This can be done by creating OnlyStakingManager modifier.

Devs Response:

As TokenPool contract is deployed by stakingManger contract, and there is no way to whitelist users from stakingManger contract, so the only whitelisted account will be StakingManger contract's Address. There is no way to withdraw staked tokens

Remarks:

As TokenPool smart contract is deployed from staking Manger so the funds are safe.

Low-risk issues

1. Reward Balance calculated incorrectly

File: StakingManagerv1.sol

```
function rewardBalance(address user) external view returns (uint) {

return (userStake.totalUnclaimed *
networkDemand.calculateNetworkDemand()) /
(userStake.lastDemandFactor);

}
```

When a user claims/unstake tokens, the reward fee is applied. But in the above function implementation no reward fee is adjusted. This will create a bad-user experience.

Remedy:

Adjust the reward fee while calculating reward balance.

2. Gas Cost Optimization While staking

File: RebaseEngine.sol

When a user stakes, the rebase function is called, which in turns calls the _rebase(address user) internal function which calculates the reward for the user. As the rewards are also calculated on claimRewards and Unstake. When calling the stake method, Only user's stake metadata like lastStakingAccumulatedWeight and other params should be updated. Instead of calling the whole _rebase(address user), add another function which just updates the necessary parameters.

Devs Response:

With the previous formula, explained in High Risk Issue 1, it needs to be done in that way.

Update (Aug 4th, 2021):

RebaseEngine smart contract is being refactored.

3. Changing Owner should be in two steps

Files: Any file that is derived from Openzeppelin’s Ownable.sol.

Ownable files should implement two step ownership transfer. This eliminates the risk if the owner is mistakenly set to some address, which doesn't have access to private keys.

Devs Response:

They are satisfied with the current approach and want to continue doing so.

DISCLAIMER

The smart contracts provided by the client for audit purposes have been thoroughly analyzed in compliance with the global best practices till date w.r.t cybersecurity vulnerabilities and issues in smart contract code, the details of which are enclosed in this report.

This report is not an endorsement or indictment of the project or team, and they do not in any way guarantee the security of the particular object in context. This report is not considered, and should not be interpreted as an influence, on the potential economics of the token, its sale or any other aspect of the project.

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Smart contracts are deployed and executed on a blockchain. The platform, its programming language, and other software related to the smart contract can have its vulnerabilities that can lead to hacks. The scope of our review is limited to a review of the Solidity code and only the Solidity code we note as being within the scope of our review within this report. The Solidity language itself remains under development and is subject to unknown risks and flaws. The review does not extend to the compiler layer, or any other areas beyond Solidity that could present security risks.

This audit cannot be considered as a sufficient assessment regarding the utility and safety of the code, bug-free 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 recommend proceeding with several independent audits and a public bug bounty program to ensure security of smart contracts.