DeHacker

Code Security Assessment

DeepBrain Chain

Dec 2 6 t h , 2023

Contents

Summary

DeHacker's objective was to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices.
Possible issues we looked for included (but are not limited to):

- Transaction-ordering dependence
- Timestamp dependence
- Mishandled exceptions and call stack limits
- Unsafe external calls
- Integer overflow/underflow
- Number rounding errors
- Reentrancy and cross-function vulnerabilities
- Denial of service/logical oversights
- Access control
- Centralization of power
- Business logic contradicting the specification
- Code clones, functionality duplication
- Gas usage
- Arbitrary token minting

Issue Categories

Every issue in this report was assigned a severity level from the following:

Critical severity issues

A vulnerability that can disrupt the contract functioning in a number of scenarios or creates a risk that the contract may be broken.

Major severity issues

A vulnerability that affects the desired outcome when using a contract or provides the opportunity to use a contract in an unintended way.

Medium severity issues

A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.

Minor severity issues

A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.

Informational

A vulnerability that has informational character but is not affecting any of the code.

Overview

Project Summary

Project Name	DeepBrain Chain
Platform	Heco
Website	https://deepbrainchain.org/
Type	ERC-20
Language	Solidity

Vulnerability Summary

Vulnerability Level	Total	Pending	Mitigated	Acknowledged	Partially Resolved	Resolved
Critical	0	0	0	0	0	0
Major	1	0	0	0	0	1
Medium	0	0	0	0	0	0
Minor	0	0	0	0	0	0
Informational	1	0	0	1	0	0
Discussion	0	0	0	0	0	0

Audit scope

ID	File	SHA256 Checksum
CKP	dbc_erc20.sol	ec1c90dd935c91a23fee553e15d2e5bc8dd8930bc0f3a0aa289e907513c1d651

Findings

ID	Category	Severity	Status
CKP-01	Centralization / Privilege	Major	Resolved
DBC-01	Language Specific	Informational	Acknowledged

MAJOR

CKP-01|CENTRALIZATION RISKS

Category	Severity	Location	Status
Centralization / Privilege	Major	dbc_erc20.sol (DeepBrainChain)	Resolved

Description

In the contract dbc_erc20 the role BURN_ROLE has authority over the functions shown below .sudo_burn(): can be used to burn tokens from any account.In the contract ERC20PresetMinterPauser the role MINTER_ROLE has authority over the functions shown below.mint(): can be used to mint any amount of tokens to any account.In the contract ERC20PresetMinterPauser the role MINTER_ROLE has authority over the functions shown below.pause(): can be used to pause token transactions.unpause(): can be used to unpause token transactions.Any compromise to these accounts may allow the hacker to take advantage of these authorities.

Recommendation

The risk describes the current project design and potentially makes iterations to improve in the security operation and level ofdecentralization, which in most cases cannot be resolved entirely at the present stage. We advise the client to carefullymanage the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommendcentralized privileges or roles in the protocol be improved via a decentralized mechanism or smart-contract-based accountswith enhanced security practices, e.g., multisignature wallets. Indicatively, here are some feasible suggestions that wouldalso mitigate the potential risk at a different level in terms of short-term, long-term and permanent:
Short Term:
Timelock and Multi sign (,) combination mitigate by delaying the sensitive operation and avoiding a single point of keymanagement failure.Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
AND
Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private keycompromised;
AND
A medium/blog link for sharing the timelock contract and multi-signers addresses information with the publicaudience.

Long Term:
Timelock and DAO, the combination, mitigate by applying decentralization and transparency.Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
AND
Introduction of a DAO/governance/voting module to increase transparency and user involvement.
AND
A medium/blog link for sharing the timelock contract, multi-signers addresses, and DAO information with the publicaudience.
Permanent:
Renouncing the ownership or removing the function can be considered fully resolved.Renounce the ownership and never claim back the privileged roles.
OR
Remove the risky functionality.

INFORMATIONAL

DBC-01|UNLOCKED COMPILER VERSION DECLARATION

Category	Severity	Location	Status
Language Specific	Informational	dbc_erc20.sol (DeepBrainChain): 3	Acknowledged

Description

The compiler version utilized throughout the project uses the ^ prefix specifier, denoting that a compiler version that isgreater than the version will be used to compile the contracts. It is recommend the compiler version should be consistentthroughout the codebase.

Recommendation

It is a general practice to alternatively lock the compiler at a specific version rather than allow a range of compiler versions tobe utilized to avoid compiler-specific bugs and in so doing be able to identify emerging ones more easily. We recommendlocking the compiler at the lowest possible version that supports all the capabilities required by the codebase. This will ensurethat the project utilizes a compiler version that has been in use for the longest time and as such is less likely to contain yet-undiscovered bugs.

Disclaimer

This report is based on the scope of materials and documentation provided for a limited review at the time provided. Results may not be complete nor inclusive of all vulnerabilities. The review and this report are provided on an as-is, where-is, and as-available basis. You agree that your access and/or use, including but not limited to any associated services, products, protocols, platforms, content, and materials, will be at your sole risk. Blockchain technology 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 the programming language, or other programming aspects that could present security risks. A report does not indicate the endorsement of any particular project or team, nor guarantee its security. No third party should rely on the reports in any way, including for the purpose of making any decisions to buy or sell a product, service or any other asset. To the fullest extent permitted by law, we disclaim all warranties, expressed or implied, in connection with this report, its content, and the related services and products and your use thereof, including, without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement. We do not warrant, endorse, guarantee, or assume responsibility for any product or service advertised or offered by a third party through the product, any open source or third-party software, code, libraries, materials, or information linked to, called by, referenced by or accessible through the report, its content, and the related services and products, any hyperlinked websites, any websites or mobile applications appearing on any advertising, and we will not be a party to or in any way be responsible for monitoring any transaction between you and any third-party providers of products or services. As with the purchase or use of a product or service through any medium or in any environment, you should use your best judgment and exercise caution where appropriate.

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Appendix

Finding Categories

Centralization / Privilege

Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.

Coding Style

Coding Style findings usually do not affect the generated bytecode but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

Volatile Code

Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that may result in a vulnerability.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block. timestamp works.

Checksum Calculation Method

The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux “sha256sum" command against the target file.

About

DeHacker is a team of auditors and white hat hackers who perform security audits and assessments. With decades of experience in security and distributed systems, our experts focus on the ins and outs of system security. Our services follow clear and prudent industry standards. Whether it's reviewing the smallest modifications or a new platform, we'll provide an in-depth security survey at every stage of your company's project. We provide comprehensive vulnerability reports and identify structural inefficiencies in smart contract code, combining high-end security research with a real-world attacker mindset to reduce risk and harden code.

BLOCKCHAIINS

Ethereum

Cosmos

Eos

Substrate

TECH STACK

Python

Solidity

Rust

c++

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