CERTIK

Preliminary Comments

Wakanda Inu

Nov 12th, 2021

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Summary

This report has been prepared for Wakanda Inu to discover issues and vulnerabilities in the source code of the Wakanda Inu project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review techniques.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

Overview

Project Summary

Project Name	Wakanda Inu
Platform	BSC
Language	Solidity
Codebase	https://bscscan.com/address/0x5344C20FD242545F31723689662AC12b9556fC3d
Commit	

Audit Summary

Delivery Date	Nov 12, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

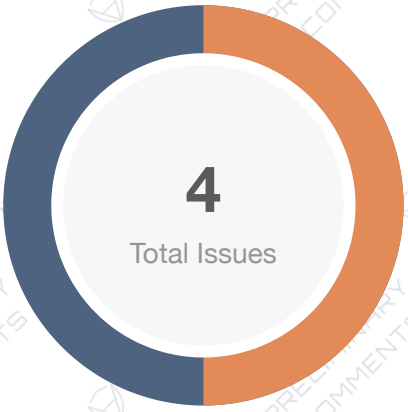
Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Resolved
Critical	0	0	0	0	0	0
Major	2	2	0	0	0	0
Medium	0	0	0	0	0	0
Minor	0	0	0	0	0	0
Informational	2	2	0	0	0	0
Discussion	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
AWI	Address.sol	4eb48209b0ac753e0b2fe28fc27e0e5d02a3d2df34fed28827ae23bceac3d1fd
BEP	BEP20.sol	ce588c7ff42c7fc12b3a8dfc39bac8cb682571c293aa94b7492bec3f93852fcb
BEW	BEP20Pausable.sol	fa4fc5c25846cd1a6ee47dcdc5a75304d8bad92c6fae9af26ba3263b6674f177
CWI	Context.sol	a5aa3db42f00c120e18661450d8e565b813b07a001574e12553672dc54539390
IBE	IBEP20.sol	27796ae202a2a04c95f107a6cb43a6e45ce3b5ac2fb865e578165b584816b3f8
OWI	Ownable.sol	e6bd4987049792556890270fa53e81dd129c5cacaeed348ef0090f8372b157fe
PWI	Pausable.sol	abb82bfba716296350eda3077c798833cc96d6a5ff82c32e16b5df4df54e723d
SBE	SafeBEP20.sol	8b06e98ac5bf24973b63afa9efdaa4e013035eecc0fa48434d5d017a19e4d4ea
SMW	SafeMath.sol	4027ab1d37c404f140afb6d9a1ef7b08c66cc4ea88cf032107a976220cb73e0f
WIT	WakandaInuToken.sol	89db9db7d12567d67d00f3432e0ab9013285a9ab02c06f1b1dc491e25d875644

Findings



Critical	0 (0.00%)
Major	2 (50.00%)
Medium	0 (0.00%)
Minor	0 (0.00%)
Informational	2 (50.00%)
Discussion	0 (0.00%)

ID	Title	Category	Severity	Status
BEP-01	Initial Token Distribution	**Centralization / Privilege**	**Major**	Pending
WIT-01	Unused Variable	Gas Optimization	Informational	Pending
WIT-02	Centralization Risk	**Centralization / Privilege**	**Major**	Pending
WIT-03	Function Visibility Optimization	Gas Optimization	Informational	Pending

BEP-01 | Initial Token Distribution

Category	Severity	Location	Status
Centralization / Privilege	Major	projects/WakandaInu/BEP20.sol (f2133cb): 69	Pending

Description

All of the `WakandaInu` tokens are sent to the contract deployer when deploying the contract. This could be a centralization risk as the deployer can distribute `WakandaInu` tokens without obtaining the consensus of the community.

Recommendation

We recommend the team to be transparent regarding the initial token distribution process, and the team shall make enough efforts to restrict the access of the private key.

WIT-01 | Unused Variable

Category	Severity	Location	Status
Gas Optimization	Informational	projects/WakandaInu/WakandaInuToken.sol (f2133cb): 14	Pending

Description

The variable `_price` is declared but never used.

Recommendation

If there isn't any intention to use the variable, we recommend to remove it. However, if there was suppose to be some implementation with this variable, then there is an issue because the variable is never called.

WIT-02 | Centralization Risk

Category	Severity	Location	Status
Centralization / Privilege	Major	projects/WakandaInu/WakandaInuToken.sol (f2133cb): 18, 54, 59	Pending

Description

In the contract `WakandaInu`, the role `owner` has the authority over the following functions:

- `withdrawTokens`
- `withdraw()`
- `withdraw(address tokenAddress)`

We will list the potential threats that can be implemented if the `owner` account is compromised i.e hacked. The compromised `owner` account can:

- transfer the funds stored in the contract to their address using the `withdraw()` function
- transfer all tokens that are stored in the contracts balance to their address via the `withdrawTokens` function
- transfer any tokens from another contract to their personal address via the `withdraw(address tokenAddress)` function

Recommendation

We advise the client to carefully manage the `WakandaInu` account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol to be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., Multisignature wallets.

Indicatively, here is some feasible suggestions that would also mitigate the potential risk at the different level in term of short-term and long-term:

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key;
- Introduction of a DAO/governance/voting module to increase transparency and user involvement.

WIT-03 | Function Visibility Optimization

Category	Severity	Location	Status
Gas Optimization	Informational	projects/WakandaInu/WakandaInuToken.sol (f2133cb): 29, 18, 54	Pending

Description

The following functions are declared as `public`, and are not invoked in any of the contracts contained within the project's scope.

- `burn()`
- `burnFrom()`
- `withdrawTokens()`

The functions that are never called internally within the contract should have external visibility.

The following functions are declared as `public`, contain array function arguments, and are not invoked in any of the contracts contained within the project's scope. The functions that are never called internally within the contract should have external visibility.

Recommendation

We advise that the functions' visibility specifiers are set to `external` optimizing the gas cost of the function.

For example, in the `WakandaInuToken.sol` contract we can replace line 29 with

```
function burn(uint256 amount) external virtual {
    _burn(_msgSender(), amount);
}
```

Notice the only thing that we changed is the visibility from `public` to `external`.

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.

Gas Optimization

Gas Optimization findings do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

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.

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