STAYSAFU

AUDIT

August 4TH, 2022

Animal Battle

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AUDIT SUMMARY

This report was written for Animal Battle ($AML) in order to find flaws and vulnerabilities in the Animal Battle project's source code, as well as any contract dependencies that weren't part of an officially recognized library.

A comprehensive examination has been performed, utilizing Static Analysis, Manual Review, and Animal Battle Deployment 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
- Through line-by-line manual review of the entire codebase by industry expert

AUDIT OVERVIEW

PROJECT SUMMARY

Project name	Animal Battle
Description	Animal Battle is the first crossover board game based on the web 3.0 concept and developed with a custom engine. The main founding team is from India. Our supporters include: former employees of sandbox, former employees of BinaryX, and 38 bored apes.
Platform	BNB Chain
Language	Solidity
Codebase	https://bscscan.com/address/0xBC01d0e46e1b6Da429e4F9C60F281f53322477aE#code

FINDINGS SUMMARY

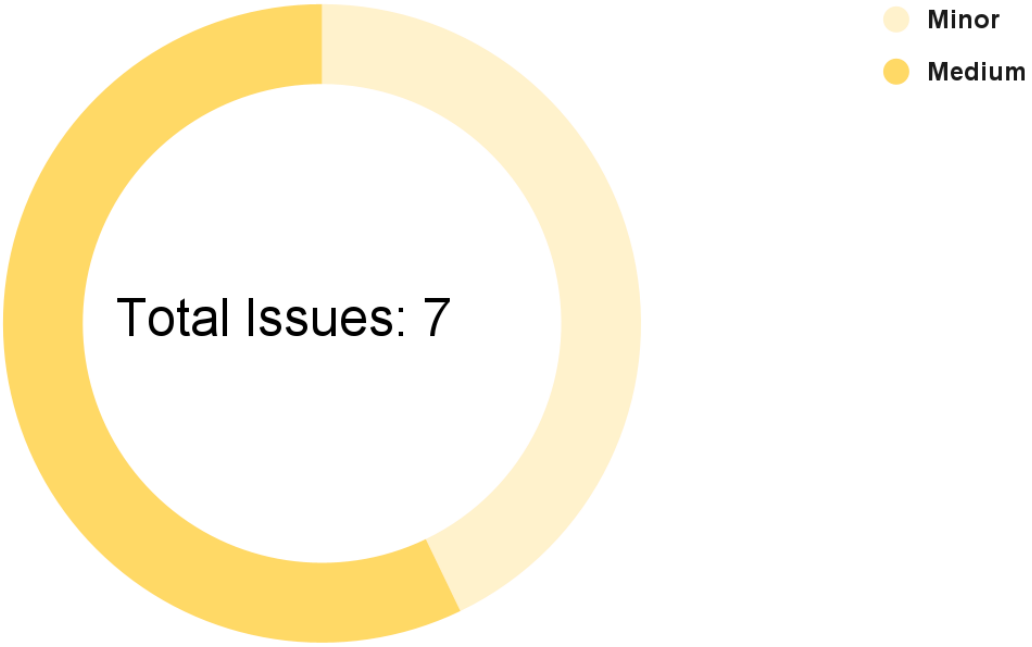
Vulnerability	Total
Critical	0
Major	0
Medium	4
Minor	3

Informational	0

EXECUTIVE SUMMARY

There have been no major or critical issues related to the codebase and all findings listed here range from informational to medium. The medium security issues are the dependence on a decentralized exchange platform, centralization of privileges, centralisation of initial token distribution and missing threshold checks.

AUDIT FINDINGS



Code	Title	Severity
CENT-1	Centralization of major privileges	Medium
CENT-2	Centralization of initial token distribution	Medium
EXT-1	External protocol dependencies	Medium
THRE-1	Missing threshold checks	Medium
COMP-1	Unfixed version of compiler	Minor
GAS-1	Unoptimized function type	Minor
MSG-1	Missing event emits	Minor

CENT-1 | Centralization of major privileges

Description

The onlyOwner modifier of the smart contract(s) gives major privileges over it (change fees, change marketing wallet, change max tx amount)*. This can be a problem, in the case of a hack, an attacker who has taken possession of this privileged account could damage the project and the investors.

*This list is not exhaustive but presents the most sensitive points

Recommendation

We recommend at least to use a multi-sig wallet as the owner address, and at best to establish a community governance protocol to avoid such centralization. For more information, see https://solidity-by-example.org/app/multi-sig-wallet/

CENT-2 | Centralization of initial token distribution

Description

A constructor (line 434) within the contract mints the initial token supply to the deployer address (msg.sender). This initially centralizes token supply to the deployer address.

Recommendation

We recommend decentralising tokens as soon as possible, matching the project's intentions. Examples of this are burning tokens or adding tokens to a liquidity pool (locked). We also recommend being fully transparent with the community about token distribution.

EXT-1 | Dependence to external protocol

Description

The contract interacts with PancakeSwap protocols. The scope of the audit would treat these third party entities as black boxes and assume they are fully functional. However in the real world, third parties may be compromised thus leading assets to be lost or stolen. We fully understand that the business logic of the Animal Battle project is designed to work with PancakeSwap protocols. This extends to other protocols and interfaces not within the scope of this audit.

Recommendation

We encourage the team to constantly monitor the security level of the entirety of PancakeSwap protocols interacted with, as the security of the project is highly dependent on the security of these decentralized exchange platforms.

THRE-1 | Missing threshold checks

Description

Functions which can change sensitive variables within Animal Battle's contract do not contain threshold checks to ensure these variables are not changed to unreasonable values. This includes: max tx amount. As such it is important to add a threshold to prevent an attacker from setting max transaction amount as 0. Key examples of Identified functions with this issue have been listed below:

- updateMaxWallet -> Line 517
- updateMaxTransactionAmount -> Line 521

Recommendation

We recommend adding threshold checks using require statements for each of the identified functions above and other functions with this issue.

COMP-1 | Unlocked compiler version

Description

Animal Battle's contract does not have locked compiler versions, meaning a range of compiler versions can be used. This can lead to differing bytecodes being produced depending on the compiler version, which can create confusion when debugging, as bugs may be specific to a specific compiler version(s).

Recommendation

To rectify this, we recommend setting the compiler to a single version, the version tested the most to be compatible with the code, an example of this change can be seen below.

```
pragma solidity 0.8.13;
```

GAS-1 | Unoptimized function type

Description

Throughout Animal Battle's contracts some functions are of type public although they are never called within the contract. External functions require significantly less gas to call. Such found functions are listed below:

- updatePancakeRouter -> Line 480
- setAutomatedMarketMakerPair -> Line 567

Recommendation

We recommend reviewing each of the functions listed above and where possible switch their type from public to external.

MSG-1 | Missing event emits

Description

Some functions within Animal Battle's contracts modify sensitive variables without emitting an event. Functions with this issue are listed below:

- updateMaxWallet -> Line: 517
- updateMaxTransactionAmount -> Line: 521

Recommendation

We recommend amending these functions to include event emits to ensure transparency with users.

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