CERTIK

Security Assessment

Amazy NFT Upgrade

Jul 9th, 2022

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Summary

This report has been prepared for Amazy to discover issues and vulnerabilities in the source code of the Amazy NFT Upgrade 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	Amazy NFT Upgrade
Platform	BSC
Language	Solidity
Codebase	https://testnet.bscscan.com/address/0xc29e080081647bcC5531f6b8dD6a133899DaaDCC

Audit Summary

Delivery Date	Jul 09, 2022 UTC
Audit Methodology	Static Analysis, Manual Review

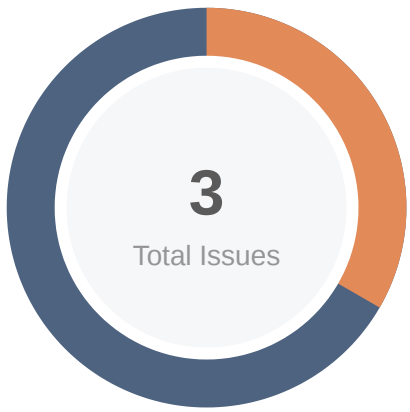
Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Mitigated	Partially Resolved	Resolved
Critical	0	0	0	0	0	0	0
Major	1	0	0	1	0	0	0
Medium	0	0	0	0	0	0	0
Minor	0	0	0	0	0	0	0
Optimization	2	0	0	0	0	0	2
Informational	2	0	0	2	0	0	0
Discussion	0	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
AUS	AmazyUpgrade.sol	fc5c6ef5158d0ab097f7e06ffa3fd4b61da087ce52ba3fffe954ae5ee0cdb683

Findings



Critical	0 (0.00%)
Major	1 (33.33%)
Medium	0 (0.00%)
Minor	0 (0.00%)
Informational	2 (66.67%)
Discussion	0 (0.00%)

ID	Title	Category	Severity	Status
AUC-03	Logic Issue On `upgradeAmount`	Logical Issue	Informational	Acknowledged
AUC-04	Logic Issue On `AmazyUpgrade`	Logical Issue	Informational	Acknowledged
AUS-01	Centralization Related Risks In `AmazyUpgrade.sol`	**Centralization / Privilege**	**Major**	Acknowledged

AUC-03 | Logic Issue On `upgradeAmount`

Category	Severity	Location	Status
Logical Issue	Informational	AmazyUpgrade.sol (0x2ed1b): 1104	Acknowledged

Description

The current length of array `_ids` is assigned to the `upgradeAmount`, we would like to confirm with the client if the current implementation aligns with the original project design.

Recommendation

We recommend reviewing the logic and ensuring it is intended.

Alleviation

The team acknowledged this issue and they stated the following:

"They remember the length of the NFT ID array so that later they can see how many tokens were involved in the upgrade."

AUC-04 | Logic Issue On `AmazyUpgrade`

Category	Severity	Location	Status
Logical Issue	Informational	AmazyUpgrade.sol (0x2ed1b): 965	Acknowledged

Description

In the contract `AmazyUpgrade`, users can call functions `request()` and `upgrade()` to transfer tokens to the account `beneficiary`, however, there is no function to transfer tokens from the account `beneficiary` back to users in the upgraded contract. We would like to confirm with the client if the current implementation aligns with the original project design.

Recommendation

We wish the team could explain more on the purpose of functions `request()` and `upgrade()`.

Alleviation

The team acknowledged this issue and they stated the following:

"This is by design, this is the user payments for the game functions - sneakers upgrade and level increase."

AUS-01 | Centralization Related Risks In `AmazyUpgrade.sol`

Category	Severity	Location	Status
Centralization / Privilege	**Major**	AmazyUpgrade.sol: 1118, 1125, 1137, 1175, 1179	Acknowledged

Description

In the contract `AmazyUpgrade`, the role `INFO_ROLE` has authority over the following functions:

- function setUpgradeNewIds(), to add new token ids to upgrade.

Any compromise to the `INFO_ROLE` account may allow a hacker to take advantage of this authority.

In the contract `AmazyUpgrade`, the role `DEFAULT_ADMIN_ROLE` has authority over the following functions:

- function changeSettings(), to change the addresses of `_beneficiary`, `_contractAMT` and ``._contractAZY
- function changeType(), to change the type information.

Any compromise to the `DEFAULT_ADMIN_ROLE` account may allow a hacker to take advantage of this authority.

In the contract `AmazyUpgrade`, the role `PAUSER_ROLE` has authority over the following functions:

- function pause(), to trigger the stopped state of the contract.
- function unpause(), to return to the normal state of the contract.

Any compromise to the `PAUSER_ROLE` account may allow a hacker to take advantage of this authority.

Recommendation

The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralization, which in most cases cannot be resolved entirely at the present stage. We advise the client to carefully manage the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., multi-signature wallets.

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

Short Term:

Timelock and Multi sign (⅔, ⅗) combination *mitigate* by delaying the sensitive operation and avoiding a single point of key management 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 key compromised;
  AND
- A medium/blog link for sharing the timelock contract and multi-signers addresses information with the public audience.

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 public audience.

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.

Noted: Recommend considering the long-term solution or the permanent solution. The project team shall make a decision based on the current state of their project, timeline, and project resources.

Alleviation

The team acknowledged the issue and stated they will adopt the multisign solution to ensure the private key management process.

Optimizations

ID	Title	Category	Severity	Status
AUC-01	Variables That Could Be Declared As Immutable	Gas Optimization	Optimization	Resolved
AUC-02	Comparison To A Boolean Constant	Gas Optimization	Optimization	Resolved

AUC-01 | Variables That Could Be Declared As Immutable

Category	Severity	Location	Status
Gas Optimization	Optimization	AmazyUpgrade.sol (0x2ed1b): 971	Resolved

Description

The linked variables assigned in the constructor can be declared as `immutable`. Immutable state variables can be assigned during contract creation but will remain constant throughout the lifetime of a deployed contract. A big advantage of immutable variables is that reading them is significantly cheaper than reading from regular state variables since they will not be stored in storage.

Recommendation

We recommend declaring these variables as immutable. Please note that the `immutable` keyword only works in Solidity version `v0.6.5` and up.

Alleviation

The team heeded our advice and resolved this issue in address :

https://testnet.bscscan.com/address/0x6cdD90B6cC2f147E0197E1317785C86a389a0207#code

AUC-02 | Comparison To A Boolean Constant

Category	Severity	Location	Status
Gas Optimization	Optimization	AmazyUpgrade.sol (0x2ed1b): 1039, 1069, 1139	Resolved

Description

Boolean constants can be used directly and do not need to be compared to true or false.

Recommendation

We recommend removing the comparison to the boolean constant.

Alleviation

The team heeded our advice and resolved the issue in addresses :

https://testnet.bscscan.com/address/0x6cdD90B6cC2f147E0197E1317785C86a389a0207#code

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.

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.

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