CERTIK

Security Assessment

Amazy Marketplace

Jul 28th, 2022

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Disclaimer

About

Summary

This report has been prepared for Amazy to discover issues and vulnerabilities in the source code of the Amazy Marketplace 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 Marketplace
Platform	BSC
Language	Solidity
Codebase	https://testnet.bscscan.com/address/0x1fe2B0aD606dafb218d7B093d89af7023144fE53 https://testnet.bscscan.com/address/0x318dfe93598c8da0855c7dcefd4c76e4d2d37038 https://bscscan.com/address/0x70624f31d403b5a5505b9127663674fc1195c383

Audit Summary

Delivery Date	Jul 28, 2022 UTC
Audit Methodology	Static Analysis, Manual Review

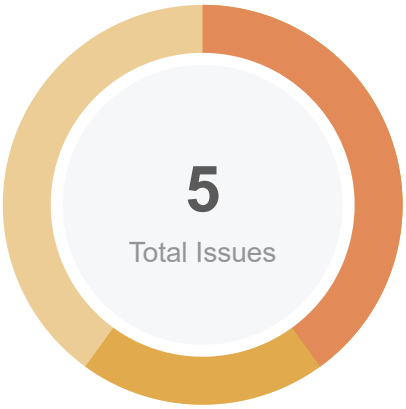
Vulnerability Summary

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

Audit Scope

ID	File	SHA256 Checksum
AMS	AmazyMarketplace.sol	4630f19a4421db8ea668970ab61ad81515967490bc243b9c12c0227f459be555

Findings



Critical	**0** (0.00%)
Major	**2** (40.00%)
Medium	**1** (20.00%)
Minor	**2** (40.00%)
Informational	**0** (0.00%)
Discussion	**0** (0.00%)

ID	Title	Category	Severity	Status
AMB-01	Logic Issue On Function `Sell()`	Logical Issue	Major	Resolved
AMB-02	Check Effect Interaction Pattern Violated	Logical Issue	Medium	Resolved
AMS-01	Centralization Related Risks In `AmazyMarketplace.sol`	**Centralization / Privilege**	**Major**	Acknowledged
AMS-02	Divide Before Multiply	Mathematical Operations	Minor	Resolved
AMS-03	No Restrictions For Deals	Logical Issue	Minor	Acknowledged

AMB-01 | Logic Issue On Function `Sell()`

Category	Severity	Location	Status
Logical Issue	Major	AmazyMarketplace.sol (V2): 1505	Resolved

Description

Anyone can call the function `sell()` to create a sale for the ERC721 token owner `_from`, and the seller of the sale is `msg.sender`. Since the approval will be granted to the market, the attacker can call the `sell()` to transfer others' NFT once they know the approval.

Recommendation

We recommend reviewing the logic again and refactoring the logic.

Alleviation

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

https://bscscan.com/address/0x70624f31d403b5a5505b9127663674fc1195c383#code

AMB-02 | Check Effect Interaction Pattern Violated

Category	Severity	Location	Status
Logical Issue	Medium	AmazyMarketplace.sol (V2): 1518, 1528	Resolved

Description

The order of external call/transfer and storage manipulation must follow the check-effect-interaction pattern. Since the function `sell()` does not check whether the caller is EOA or contract, the seller could be a contract. Once a user calls the `buy()`, the market will transfer platform native tokens(BNB) to the seller. In case the seller is a contract, it can call back in its `receive()` function and re-enter the `sell()/cancel()` functions.

Recommendation

We advise the client to check if storage manipulation is before the external call/transfer operation.LINK

Additionally, we advise to add the `nonReentrant` modifier to the functions `sell()/cancel()` as well.

Alleviation

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

https://bscscan.com/address/0x70624f31d403b5a5505b9127663674fc1195c383#code

AMS-01 | Centralization Related Risks In `AmazyMarketplace.sol`

Category	Severity	Location	Status
Centralization / Privilege	**Major**	AmazyMarketplace.sol (0x1fe2B0aD606dafb218d7B093d89af7023144fE53): 1769, 1776, 1782, 1791, 1795	Acknowledged

Description

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

- function addToWhitelist(), to add the address to the whitelist.
- function removeFromWhitelist(), to remove the address from the whitelist.
- function changeFee(), to change the fee ratio and the address to charge fees.

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

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

- function pause(), to trigger the stopped state.
- function _unpause(), to return to the normal state.

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.

AMS-02 | Divide Before Multiply

Category	Severity	Location	Status
Mathematical Operations	Minor	AmazyMarketplace.sol (0x1fe2B0aD606dafb218d7B093d89af7023144fE53): 1758	Resolved

Description

Performing integer division before multiplication truncates the low bits, losing the precision of calculation.

```
1758    uint256 _fee = sale[_id].price.div(denominator).mul(sale[_id].fee);
```

Recommendation

We recommend applying multiplication before division to avoid loss of precision.

Alleviation

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

https://bscscan.com/address/0x70624f31d403b5a5505b9127663674fc1195c383#code

AMS-03 | No Restrictions For Deals

Category	Severity	Location	Status
Logical Issue	Minor	AmazyMarketplace.sol (0x1fe2B0aD606dafb218d7B093d89af7023144fE53): 1732	Acknowledged

Description

There is no start time for the deals. If a user calls the `sell()` with the wrong price he might lose his NFT if he cannot call the `cancel()` immediately.

Recommendation

We would like to confirm with the client if the current implementation aligns with the original project design.

Alleviation

The team acknowledged this issue and they will leave it as it is for now.

Optimizations

ID	Title	Category	Severity	Status
AMS-04	Unnecessary Use Of SafeMath	Gas Optimization	Optimization	Resolved
AMS-05	Comparison To A Boolean Constant	Gas Optimization	Optimization	Resolved

AMS-04 | Unnecessary Use Of SafeMath

Category	Severity	Location	Status
Gas Optimization	Optimization	AmazyMarketplace.sol (0x1fe2B0aD606dafb218d7B093d89af7023144fE53)	Resolved

Description

The `SafeMath` library is used unnecessarily. With Solidity compiler versions 0.8.0 or newer, arithmetic operations will automatically revert in case of integer overflow or underflow.

Recommendation

We advise removing the usage of `SafeMath` library and using the built-in arithmetic operations provided by the Solidity programming language.

Alleviation

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

https://bscscan.com/address/0x70624f31d403b5a5505b9127663674fc1195c383#code

AMS-05 | Comparison To A Boolean Constant

Category	Severity	Location	Status
Gas Optimization	Optimization	AmazyMarketplace.sol (0x1fe2B0aD606dafb218d7B093d89af7023144fE53): 1748	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://bscscan.com/address/0x70624f31d403b5a5505b9127663674fc1195c383#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.

Mathematical Operations

Mathematical Operation findings relate to mishandling of math formulas, such as overflows, incorrect operations etc.

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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