CERTIK

Preliminary Comments

Decentraland 3

Dec 3rd, 2021

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Summary

This report has been prepared for Decentraland to discover issues and vulnerabilities in the source code of the Decentraland 3 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	Decentraland 3
Platform	Polygon
Language	Solidity
Codebase	https://github.com/decentraland/marketplace-contracts https://github.com/decentraland/bid-contract
Commit	637f112d2370a3bb179acdb0e907c31027cc49e3 25407d9cc7a4721815c7573dfce8160699846be4

Audit Summary

Delivery Date	Dec 03, 2021
Audit Methodology	Static Analysis, Manual Review
Key Components	

Vulnerability Summary

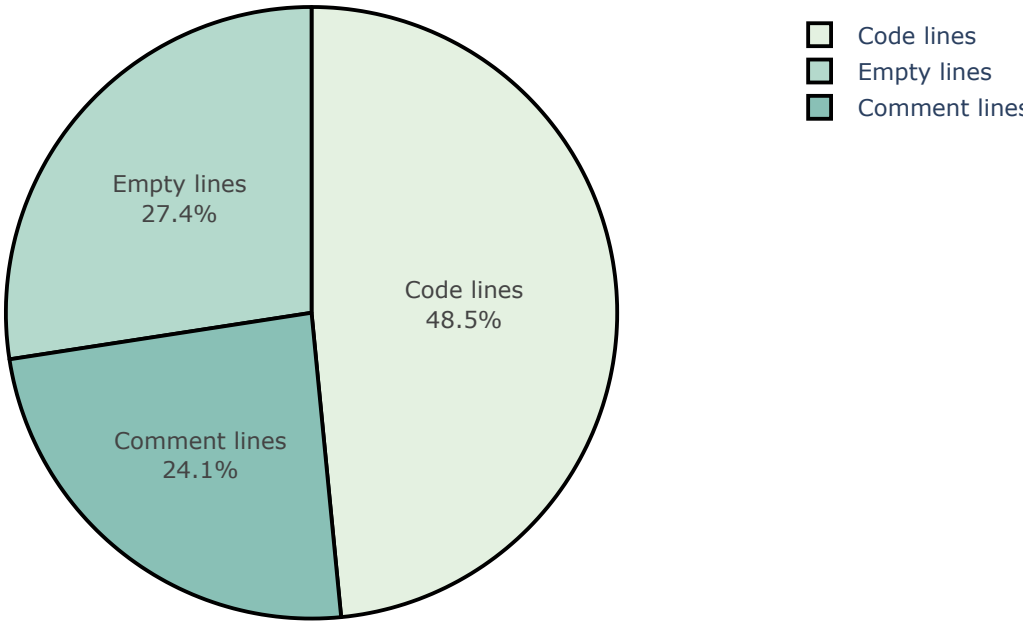
Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Resolved
Critical	0	0	0	0	0	0
Major	2	2	0	0	0	0
Medium	0	0	0	0	0	0
Minor	0	0	0	0	0	0
Informational	2	2	0	0	0	0
Discussion	0	0	0	0	0	0

Audit Scope

ID	File	SHA256 Checksum
ERC	bid-contract:pull:2:contracts/bid/ERC721Bid.sol	0d58d3858ed194f4a3a33092a159c016c683e9def4782138bb9f4fdae2b87e39
ERB	bid-contract:pull:2:contracts/bid/ERC721BidStorage.sol	1180603d7158931ea5fc310cda743172f1e507690a46aecb6b4282b5e4ce6ae1
RMC	marketplace-contracts:pull:56:contracts/managers/RoyaltiesManager.sol	562fbbfbfc2e66d2c6d7064aaee740bfae8610a9b5ddb9b5b3e16cefaee18e4f
MVC	marketplace-contracts:pull:56:contracts/marketplace/MarketplaceV2.sol	e1253eda9e0b5a8b69b99fe42af09c4b9c8dafc4a9681c70f1e34c40bb00b943

Diagrams

Source Line Chart



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
DEC-01	Unlocked Compiler Version	Language Specific	Informational	Pending
ERC-01	Centralization Risk: In Contract `ERC721Bid.sol` : The Owner Has Authority Over Several Functions	**Centralization / Privilege**	**Major**	Pending
ERC-02	Missing Emit Events In Function `pause()`	Coding Style	Informational	Pending
MVC-01	Centralization Risk: In Contract `MarketplaceV2.sol` : The Owner Has Authority Over Several Functions	**Centralization / Privilege**	**Major**	Pending

DEC-01 | Unlocked Compiler Version

Category	Severity	Location	Status
Language Specific	Informational	projects/decentraland3/bid-contract:pull:2:contracts/bid/ERC721Bid.sol (bec61a5): 3 projects/decentraland3/bid-contract:pull:2:contracts/bid/ERC721BidStorage.sol (bec61a5): 3 projects/decentraland3/marketplace-contracts:pull:56:contracts/marketplace/MarketplaceV2.sol (bec61a5): 3 projects/decentraland3/marketplace-contracts:pull:56:contracts/managers/RoyaltiesManager.sol (bec61a5): 3	Pending

Description

The contract uses the "^" prefix specifier and thus it has an unlocked compiler version. An unlocked compiler version, in the source code of the contract, permits the user to compile it at or above a particular version. This, in turn, leads to differences in the generated bytecode between compilations due to differing compiler version numbers. This can lead to ambiguity when debugging as compiler-specific bugs may occur in the codebase that would be hard to identify throughout multiple compiler versions rather than a specific one.

Recommendation

We advise that the compiler version is instead locked at the lowest version possible that the contract can be compiled at. The following line of code can be added to the project:

```
pragma solidity 0.8.10;
```

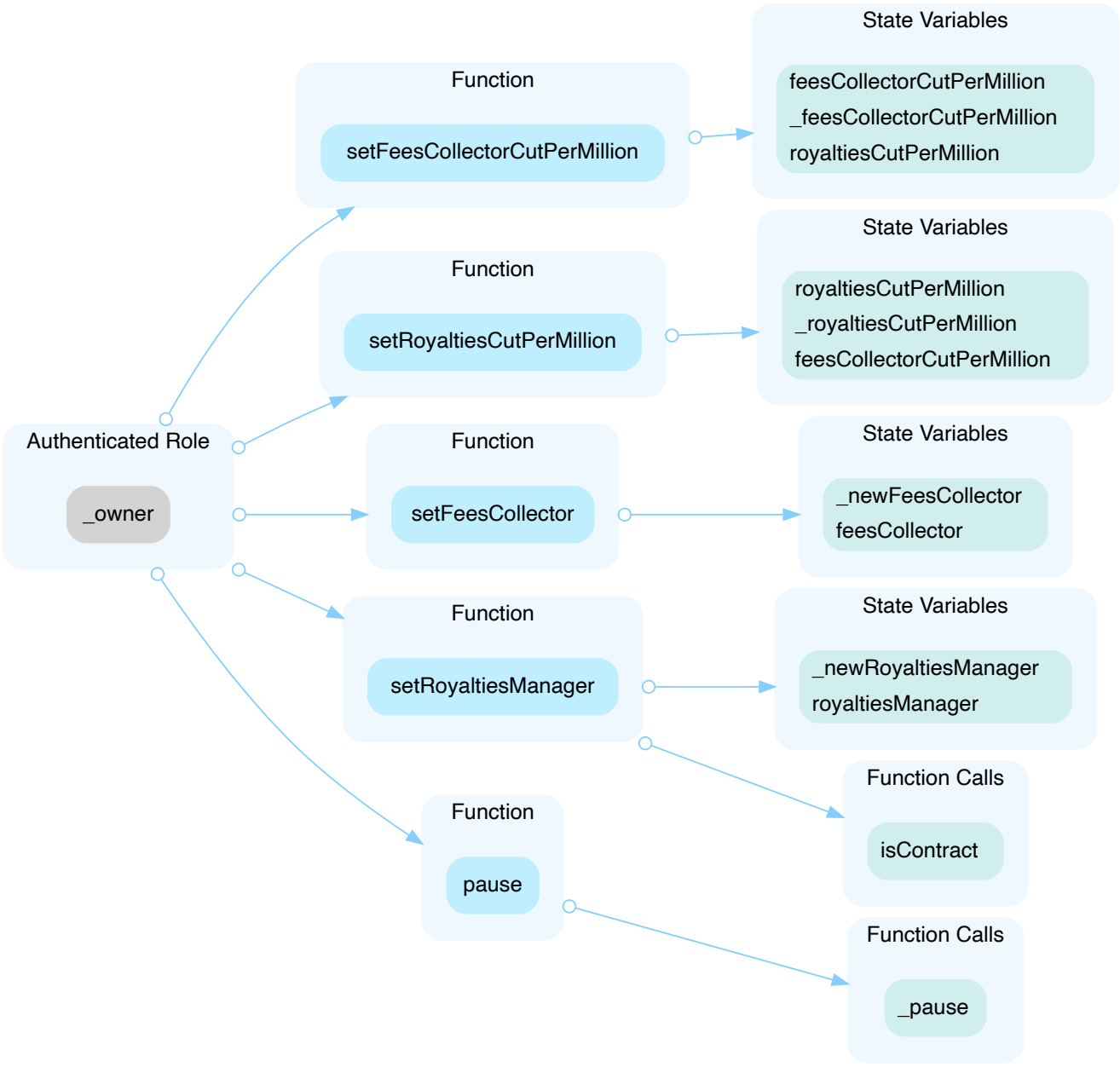
ERC-01 | Centralization Risk: In Contract `ERC721Bid.sol` : The Owner Has Authority Over Several Functions

Category	Severity	Location	Status
Centralization / Privilege	**Major**	projects/decentraland3/bid-contract:pull:2:contracts/bid/ERC721Bid.sol (bec61a5): 540~549, 556~565, 571~576, 582~588, 593~595	Pending

Description

In the contract `ERC721Bid`, the role `_owner` has the authority over the functions shown in the diagram below. Thus he can change alone sensitve contract variables.

Moreover, any compromise to the privileged account which has access to `_owner` may allow the hacker to take advantage of this.



Recommendation

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 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;

- Introduction of a DAO/governance/voting module to increase transparency and user involvement.
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key;

As for the multisig, the common practice is to adopt a Gnosis safe and transfer the ownership of the contract to the Gnosis safe deployment.

ERC-02 | Missing Emit Events In Function `pause()`

Category	Severity	Location	Status
Coding Style	Informational	projects/decentraland3/bid-contract:pull:2:contracts/bid/ERC721Bid.sol (bec61a5): 593~595	Pending

Description

The function that affects the status of sensitive variables should be able to emit clear events as notifications.

The following function should emit an event when called.

- `pause()`

Recommendation

It is recommended emitting events for the sensitive functions that control states of the contract.

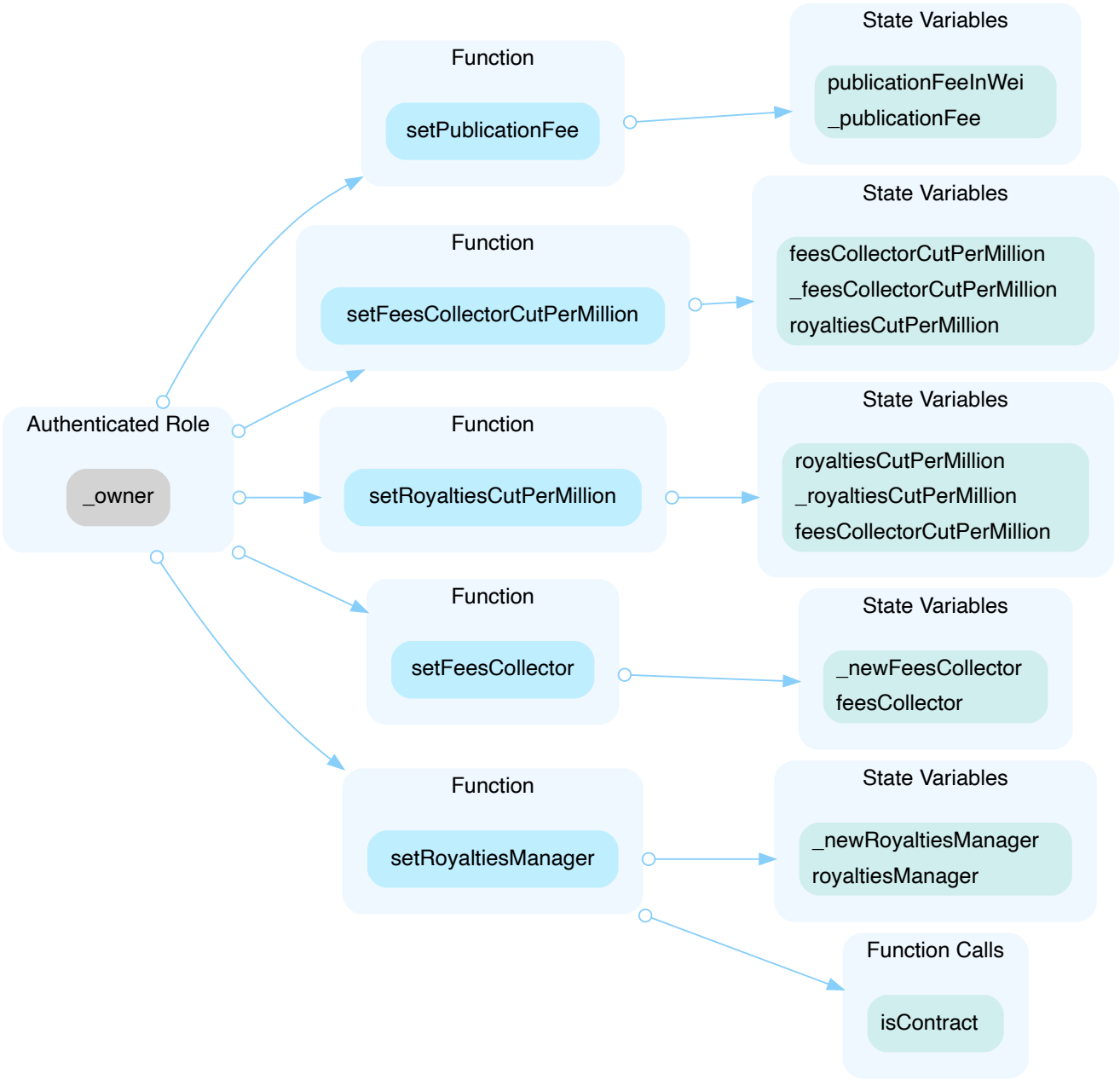
MVC-01 | Centralization Risk: In Contract `MarketplaceV2.sol` : The Owner Has Authority Over Several Functions

Category	Severity	Location	Status
Centralization / Privilege	**Major**	projects/decentraland3/marketplace-contracts:pull:56:contracts/marketplace/MarketplaceV2.sol (bec61a5): 123~126, 133~142, 149~158, 164~169, 175~181	Pending

Description

In the contract `MarketplaceV2`, the role `_owner` has the authority over the functions shown in the diagram below. Thus he can change alone sensitve contract variables.

Moreover, any compromise to the privileged account which has access to `_owner` may allow the hacker to take advantage of this.



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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;
- Introduction of a DAO/governance/voting module to increase transparency and user involvement.
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key;

As for the multisig, the common practice is to adopt a Gnosis safe and transfer the ownership of the contract to the Gnosis safe deployment.

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.

Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of private or delete.

Coding Style

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

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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