SOLIDProof

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Blockchain Security | Smart Contract Audits | KYC

MADE IN GERMANY

vEmpire

Audit

Security Assessment

23. March, 2022

For

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SolidProof.io Reports represent an extensive auditing process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology. Blockchain technology and cryptographic assets present a high level of ongoing risk. SolidProof’s position is that each company and individual are responsible for their own due diligence and continuous security. SolidProof in no way claims any guarantee of security or functionality of the technology we agree to analyze.

Version	Date	Description
1.0	20. March 2022	• Layout project • Automated- /Manual-Security Testing • Summary
1.1	23. March 2022	Reaudit

Network
Ethereum (ERC20)

Website
https://v-empire.io/

Telegram
https://t.me/vempirediscussion

Twitter
http://twitter.com/vempiredigital

Medium
https://medium.com/@v-empire.digital

Discord
https://discord.gg/Wk3aF3PNKM

Youtube
https://youtube.com/c/vEmpireDDAO

Description

vEmpire DDAO is the world's largest Decentralized Metaverse Investment Organization. The official vEmpire protocol incorporates different strategies to incentivize Metaverse token staking to fund the battle against centralisation.

vEmpire is entirely focused on protecting decentralized technologies through virtual property and Metaversal asset acquisition.

Project Engagement

During the 16th of March 2022, **vEmpire Team** engaged Solidproof.io to audit smart contracts that they created. The engagement was technical in nature and focused on identifying security flaws in the design and implementation of the contracts. They provided Solidproof.io with access to their code repository and whitepaper.

Logo

Contract Link

v1.0

- Github
  - https://github.com/v-Empire/vEmpire/tree/b57ad1c065431751ceb3c2c9f7d47647293592c5
  - Commit: b57ad1c065431751ceb3c2c9f7d47647293592c5

v1.1

- Github
  - https://github.com/v-Empire/vEmpire
  - Commit: 72269ce247c918410fd4c4d4d27040de1ddf83de

Vulnerability & Risk Level

Risk represents the probability that a certain source-threat will exploit vulnerability, and the impact of that event on the organization or system. Risk Level is computed based on CVSS version 3.0.

Level	Value	Vulnerability	Risk (Required Action)
Critical	9 - 10	A vulnerability that can disrupt the contract functioning in a number of scenarios, or creates a risk that the contract may be broken.	Immediate action to reduce risk level.
High	7 – 8.9	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.	Implementation of corrective actions as soon aspossible.
Medium	4 – 6.9	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.	Implementation of corrective actions in a certain period.
Low	2 – 3.9	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.	Implementation of certain corrective actions or accepting the risk.
Informational	0 – 1.9	A vulnerability that have informational character but is not effecting any of the code.	An observation that does not determine a level of risk

Auditing Strategy and Techniques Applied

Throughout the review process, care was taken to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. To do so, reviewed line-by-line by our team of expert pentesters and smart contract developers, documenting any issues as there were discovered.

Methodology

The auditing process follows a routine series of steps:

1. Code review that includes the following:
    i) Review of the specifications, sources, and instructions provided to SolidProof to make sure we understand the size, scope, and functionality of the smart contract.
    ii) Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
    iii) Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to SolidProof describe.

2. Testing and automated analysis that includes the following:
    i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
    ii) Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.

3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.

4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts.

Used Code from other Frameworks/Smart Contracts (direct imports)

Imported packages:

Dependency / Import Path	Count
@openzeppelin/contracts-upgradeable/access/AccessControlUpgradeable.sol	3
@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol	3
@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol	3
@openzeppelin/contracts-upgradeable/proxy/utils/UUPSUpgradeable.sol	3
@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol	2
@openzeppelin/contracts-upgradeable/token/ERC20/IERC20Upgradeable.sol	1
@openzeppelin/contracts-upgradeable/token/ERC721/ERC721Upgradeable.sol	1
@openzeppelin/contracts-upgradeable/token/ERC721/IERC721ReceiverUpgradeable.sol	1
@openzeppelin/contracts-upgradeable/token/ERC721/IERC721Upgradeable.sol	1
@openzeppelin/contracts-upgradeable/token/ERC721/extensions/ERC721EnumerableUpgradeable.sol	1
@openzeppelin/contracts-upgradeable/utils/CountersUpgradeable.sol	1
@openzeppelin/contracts-upgradeable/utils/cryptography/MerkleProofUpgradeable.sol	1
@openzeppelin/contracts-upgradeable/utils/math/SafeMathUpgradeable.sol	3
@openzeppelin/contracts-upgradeable/utils/structs/EnumerableSetUpgradeable.sol	1

Tested Contract Files

This audit covered the following files listed below with a SHA-1 Hash.

A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

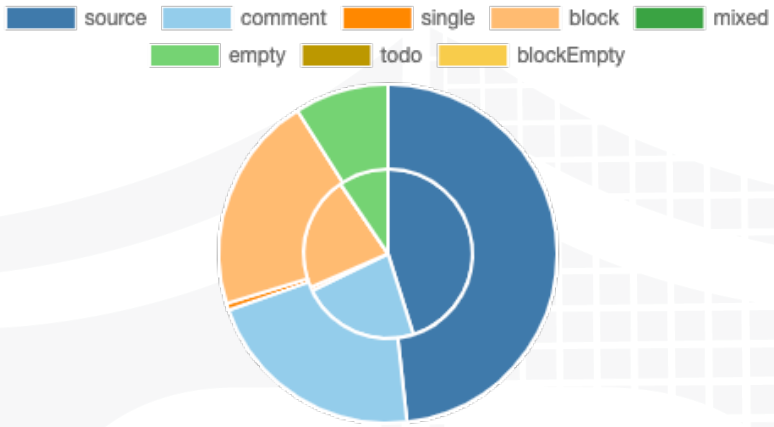
File Name	SHA-1 Hash
contracts/Staking.sol	cee40419664a8fb1bedb6cfa50dbaae80f004ec1
contracts/NFT.sol	c4e176032c3954ad9fcf83972802e0019cb3eb50
contracts/Sale.sol	145a29f7ef4dfcb2916fa691a7d471432a556b89

v1.1

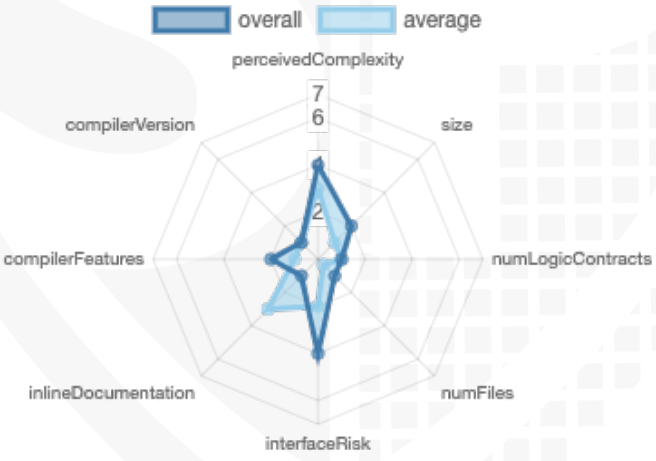
File Name	SHA-1 Hash
contracts/Staking.sol	ca6abe03ece8a01ae1c9ba044407deadcc29c4f8
contracts/NFT.sol	cc741e178ef9611791af7fb7cd3df199bb55e202
contracts/Sale.sol	145a29f7ef4dfcb2916fa691a7d471432a556b89

Metrics

Source Lines
v1.0



Risk Level
v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	4	0	0	0

Exposed Functions

This section lists functions that are explicitly declared public or payable. Please note that getter methods for public stateVars are not included.

Version	Public	Payable
1.0	36	2

Version	External	Internal	Private	Pure	View
1.0	23	43	0	1	6

State Variables

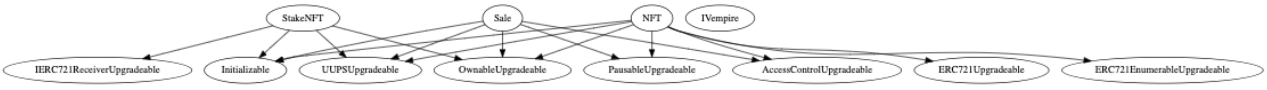
Version	Total	Public
1.0	33	30

Capabilities

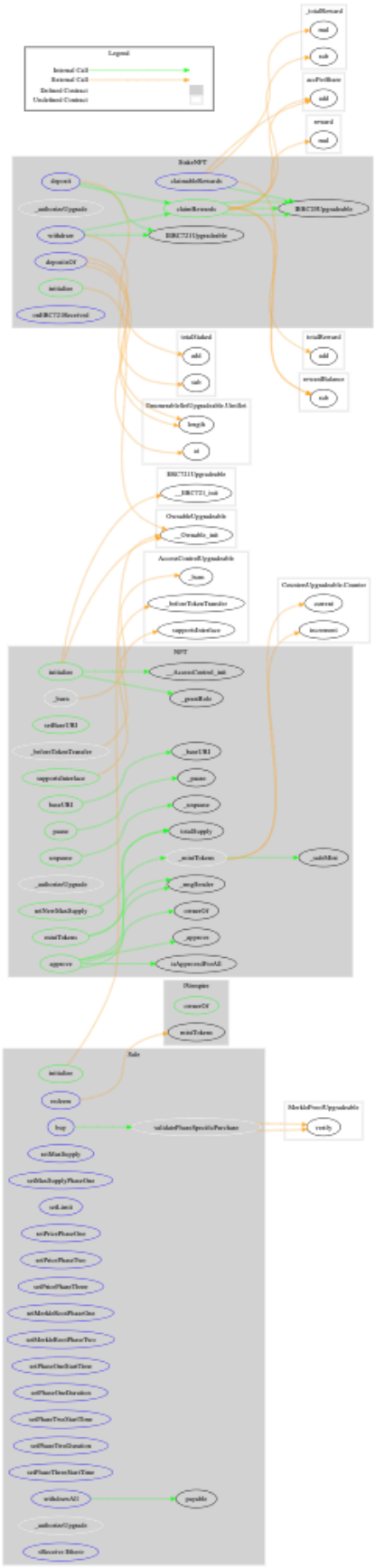
Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	`0.8.11`		`yes`		

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	ECRecover	New/Create/Create2
1.0	`yes`			`yes`		

Inheritance Graph
v1.0



CallGraph
v1.0



Scope of Work/Verify Claims

The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Correct implementation of Token standard
2. Overall checkup (Smart Contract Security)

Correct implementation of Token standard

ERC721				
Function	**Description**	**Exist**	**Tested**	**Verified**
BalanceOf	Count all NFTs assigned to an owner	✓	✓	✓
OwnerOf	Find the owner of an NFT	✓	✓	✓
SafeTransferFrom	Transfers the ownership of an NFT from one address to another address	✓	✓	✓
SafeTransferFrom	See above - Difference is that this function has an extra data parameter	✓	✓	✓
TransferFrom	Transfer ownership of an NFT	✓	✓	✓
Approve	Change or reaffirm the approved address for an NFT	✓	✓	✓
SetApprovalForAll	Enable or disable approval for a third party ("operator") to manage all of `msg.sender`'s assets	✓	✓	✓
GetApproved	Get the approved address for a single NFT	✓	✓	✓
IsApprovedForAll	Query if an address is an authorized operator for another address	✓	✓	✓
SupportsInterface	Query if a contract implements an interface	✓	✓	✓
Name	Provides information about the name	✓	✓	✓
Symbol	Provides information about the symbol	✓	✓	✓
TokenURI	Provides information about the TokenUri	✓	✓	✓

Write functions of contract v1.0

Overall checkup (Smart Contract Security)

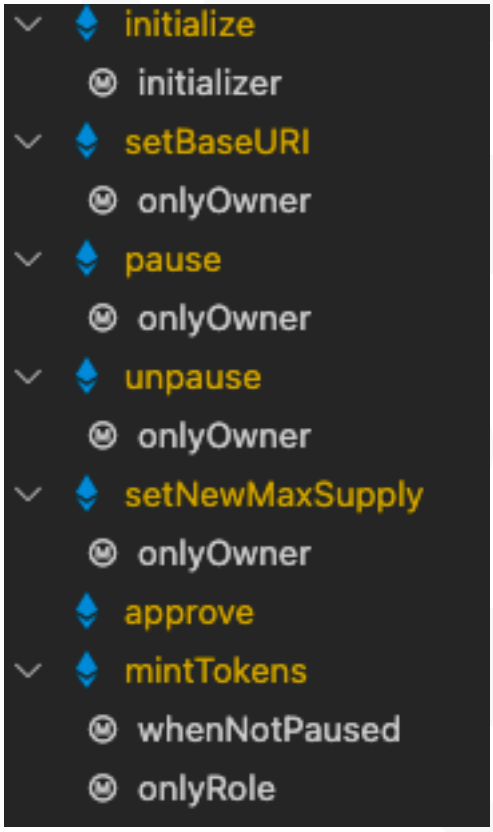
Tested	Verified
✓	✓

Legend

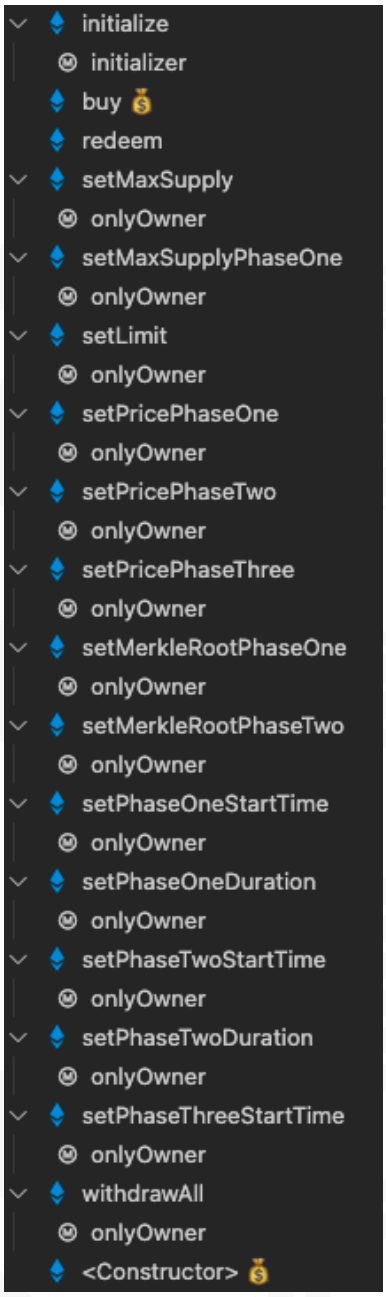
Attribute	Symbol
Verfified / Checked	✓
Partly Verified	⚑
Unverified / Not checked	✗
Not available	-

Modifiers and public functions
v1.0

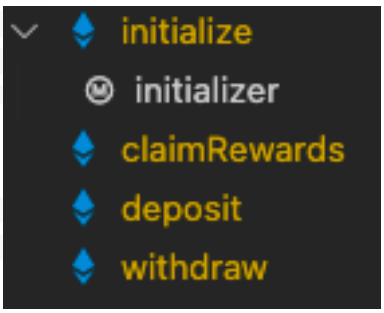
NFT



Sale



Staking



Information: Not listed functions are directly imported functions from library (openzeppelin)

Comments

- Deployer can set following state variables without any limitations
  - NFT
    - MAX_SUPPLY
      - Can be set only above total supply
  - Sale

        - maxSupply
        - maxSupplyPhaseOne
        - limit
        - phaseOnePrice
        - phaseTwoPrice
        - phaseThreePrice
        - phaseOneStartTime
        - phaseOneDuration
        - phaseTwoStartTime
        - phaseTwoDuration
        - phaseThreeStartTime

- Deployer can enable/disable following state variables
    - _paused
- Deployer can set following addresses/urls
    - _baseURIValue
- mintTokens can only be called from minter_role, if contract is not paused
- Owner can set
    - merkleRootPhaseOne
    - merkleRootPhaseTwo

Please check if an OnlyOwner or similar restrictive modifier has been forgotten.

Source Units in Scope

v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
📝	contracts/Staking.sol	1	———	235	219	143	49	120	🔹
📝	contracts/NFT.sol	1	———	197	171	94	53	80	🧱
📝	contracts/Sale.sol	2	———	416	398	223	129	145	💰🔹🧱
📝	**Totals**	**4**	———	**848**	**788**	**460**	**231**	**345**	💰🔹🧱

v1.1

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
📝	contracts/Staking.sol	1	———	236	220	144	49	123	🔹
📝	contracts/NFT.sol	1	———	193	167	91	53	79	🧱
📝	contracts/Sale.sol	2	———	416	398	223	129	145	💰🔹🧱
📝	**Totals**	**4**	———	**845**	**785**	**458**	**231**	**347**	💰🔹🧱

Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalized lines of the source unit (e.g. normalizes functions spanning multiple lines)
nSLOC	normalized source lines of code (only source-code lines; no comments, no blank lines)
Comment Lines	lines containing single or block comments
Complexity Score	a custom complexity score derived from code statements that are known to introduce code complexity (branches, loops, calls, external interfaces, ...)

Audit Results

AUDIT PASSED

Critical issues

No critical issues

High issues

No high issues

Medium issues

No medium issues

Low issues

No low issues

Informational issues

No informational issues

Test Protocol

```
Contract: ERC721
  Contract interface
    ERC165
      ERC165's supportsInterface(bytes4)
        ✔ uses less than 30k gas [skip-on-coverage]
        ✔ claims support
      supportsInterface(bytes4)
        ✔ has to be implemented
    ERC721
      ERC165's supportsInterface(bytes4)
        ✔ uses less than 30k gas [skip-on-coverage]
        ✔ claims support
```

```
    balanceOf(address)
      ✔ has to be implemented
    ownerOf(uint256)
      ✔ has to be implemented
    approve(address,uint256)
      ✔ has to be implemented
    getApproved(uint256)
      ✔ has to be implemented
    setApprovalForAll(address,bool)
      ✔ has to be implemented
    isApprovedForAll(address,address)
      ✔ has to be implemented
    transferFrom(address,address,uint256)
      ✔ has to be implemented
    safeTransferFrom(address,address,uint256)
      ✔ has to be implemented
    safeTransferFrom(address,address,uint256,bytes)
      ✔ has to be implemented
  with minted tokens
   balanceOf
    when the given address owns some tokens
      ✔ returns the amount of tokens owned by the given address
    when the given address does not own any tokens
      ✔ returns 0
    when querying the zero address
      ✔ throws
   ownerOf
    when the given token ID was tracked by this token
      ✔ returns the owner of the given token ID
    when the given token ID was not tracked by this token
      ✔ reverts
   transfers
    via transferFrom
     when called by the owner
       ✔ transfers the ownership of the given token ID to the given
address
       ✔ emits a Transfer event
(node:47847) DeprecationWarning: expectEvent.inLogs() is deprecated.
Use expectEvent() instead.
       ✔ clears the approval for the token ID
       ✔ emits an Approval event
       ✔ adjusts owners balances
       ✔ adjusts owners tokens by index
     when called by the approved individual
```

✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the operator
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the owner without an approved user
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when sent to the owner
✔ keeps ownership of the token
✔ clears the approval for the token ID
✔ emits only a transfer event
✔ keeps the owner balance
✔ keeps same tokens by index
when the address of the previous owner is incorrect
✔ reverts
when the sender is not authorized for the token id
✔ reverts
when the given token ID does not exist
✔ reverts
when the address to transfer the token to is the zero address
✔ reverts
via safeTransferFrom
with data
to a user account
when called by the owner
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID

✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the approved individual
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the operator
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the owner without an approved user
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when sent to the owner
✔ keeps ownership of the token
✔ clears the approval for the token ID
✔ emits only a transfer event
✔ keeps the owner balance
✔ keeps same tokens by index
when the address of the previous owner is incorrect
✔ reverts
when the sender is not authorized for the token id
✔ reverts
when the given token ID does not exist
✔ reverts
when the address to transfer the token to is the zero address
✔ reverts
to a valid receiver contract
✔ calls onERC721Received
✔ calls onERC721Received from approved
when called by the owner

✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the approved individual
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the operator
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the owner without an approved user
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when sent to the owner
✔ keeps ownership of the token
✔ clears the approval for the token ID
✔ emits only a transfer event
✔ keeps the owner balance
✔ keeps same tokens by index
when the address of the previous owner is incorrect
✔ reverts
when the sender is not authorized for the token id
✔ reverts
when the given token ID does not exist
✔ reverts
when the address to transfer the token to is the zero address
✔ reverts

with an invalid token id
✔ reverts
without data
to a user account
when called by the owner
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the approved individual
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the operator
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the owner without an approved user
✔ transfers the ownership of the given token ID to the given address (60ms)
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when sent to the owner
✔ keeps ownership of the token
✔ clears the approval for the token ID
✔ emits only a transfer event
✔ keeps the owner balance
✔ keeps same tokens by index
when the address of the previous owner is incorrect
✔ reverts
when the sender is not authorized for the token id

✔ reverts
when the given token ID does not exist
✔ reverts
when the address to transfer the token to is the zero address
✔ reverts
to a valid receiver contract
✔ calls onERC721Received
✔ calls onERC721Received from approved
when called by the owner
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the approved individual
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the operator
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when called by the owner without an approved user
✔ transfers the ownership of the given token ID to the given address
✔ emits a Transfer event
✔ clears the approval for the token ID
✔ emits an Approval event
✔ adjusts owners balances
✔ adjusts owners tokens by index
when sent to the owner
✔ keeps ownership of the token
✔ clears the approval for the token ID
✔ emits only a transfer event
✔ keeps the owner balance

✔ keeps same tokens by index
when the address of the previous owner is incorrect
✔ reverts
when the sender is not authorized for the token id
✔ reverts
when the given token ID does not exist
✔ reverts
when the address to transfer the token to is the zero address
✔ reverts
with an invalid token id
✔ reverts
to a receiver contract returning unexpected value
✔ reverts
to a receiver contract that reverts with message
✔ reverts
to a receiver contract that reverts without message
✔ reverts
to a receiver contract that panics
✔ reverts
to a contract that does not implement the required function
✔ reverts
approve
when clearing approval
when there was no prior approval
✔ clears approval for the token
✔ emits an approval event
when there was a prior approval
✔ clears approval for the token
✔ emits an approval event
when approving a non-zero address
when there was no prior approval
✔ sets the approval for the target address
✔ emits an approval event
when there was a prior approval to the same address
✔ sets the approval for the target address
✔ emits an approval event
when there was a prior approval to a different address
✔ sets the approval for the target address
✔ emits an approval event
when the address that receives the approval is the owner
✔ reverts
when the sender does not own the given token ID
✔ reverts
when the sender is approved for the given token ID
✔ reverts

when the sender is an operator
✔ sets the approval for the target address
✔ emits an approval event
when the given token ID does not exist
✔ reverts
setApprovalForAll
when the operator willing to approve is not the owner
when there is no operator approval set by the sender
✔ approves the operator
✔ emits an approval event
when the operator was set as not approved
✔ approves the operator
✔ emits an approval event
✔ can unset the operator approval
when the operator was already approved
✔ keeps the approval to the given address
✔ emits an approval event
when the operator is the owner
✔ reverts
getApproved
when token is not minted
✔ reverts
when token has been minted
✔ should return the zero address
when account has been approved
✔ returns approved account

Sale contract
Initial configuration
✔ Should set the right owner NFT
✔ Should set the right owner of sale
✔ Total supply of NFT should be 0
Check owner condition
✔ Should non owner tries to call setMaxSupply
✔ Should non owner tries to call setMaxSupplyPhaseOne
✔ Should non owner tries to call setLimit
✔ Should non owner tries to call setPricePhaseOne
✔ Should non owner tries to call setPricePhaseTwo
✔ Should non owner tries to call setPricePhaseThree
✔ Should non owner tries to call setPhaseOneStartTime
✔ Should non owner tries to call setPhaseOneDuration
✔ Should non owner tries to call setPhaseTwoStartTime
✔ Should non owner tries to call setPhaseTwoDuration
✔ Should non owner tries to call setPhaseThreeStartTime
✔ Should non owner tries to call setMerkleRootPhaseOne

✔ Should non owner tries to call setMerkleRootPhaseTwo
Phase one minting
✔ Buy single NFT
✔ Buy Multiple NFTs
✔ Claim with single NFTs
✔ Claim with multiple NFTs (40ms)
✔ Set new purchase amount
✔ Should revert if user tries to claim more than alloted
✔ Should revert if user tries to buy more than alloted (45ms)
✔ Should revert if user tries to buy 0 tokens
✔ Should revert if user tries to buy after sale time
✔ Should revert if user tries to buy before sale time
✔ Should revert if user tries to buy after Phase max supply reached
✔ Should revert if another user tries to buy
✔ Should revert if user tries to buy with less amount
✔ Should revert if user tries to buy multiple tokens with less amount
Phase Two minting
✔ Buy single NFT
✔ Buy Multiple NFTs
✔ Claim with single NFTs
✔ Claim with multiple NFTs (39ms)
✔ Set new purchase amount
✔ Should revert if user tries to claim more than alloted
✔ Should revert if user tries to buy 0 tokens
✔ Should revert if user tries to buy after sale time
✔ Should revert if user tries to buy before sale time
✔ Should revert if another user tries to buy
✔ Should revert if user tries to buy with less amount
✔ Should revert if user tries to buy multiple tokens with less amount
Phase Three minting
✔ Buy single NFT
✔ Buy Multiple NFTs
✔ Claim with single NFTs
✔ Claim with multiple NFTs (43ms)
✔ Set new purchase amount
✔ Should revert if user tries to claim more than alloted (38ms)
✔ Should revert if user tries to buy 0 tokens
✔ Should revert if user tries to buy before sale time
✔ Should revert if user tries to buy after Phase max supply reached
✔ Should revert if another user tries to buy
✔ Should revert if user tries to buy with less amount
✔ Should revert if user tries to buy multiple tokens with less amount

Staking contract
Initial configuration

✔ Should set the right owner NFT token
✔ Should set the right owner of stake contract
✔ Should check the total supply of NFT
Stake token
✔ Should stake the token in staking contract
✔ Should stake the multiple token in staking contract
Rewards
✔ Reward should be divided among multiple staker (94ms)
✔ Reward should not not get the tokens from previous rewards (85ms)
✔ User should get the correct tokens on claim (92ms)
✔ User should get the correct tokens on claim when multiple users stake (154ms)
Claim rewards after multiple stake/claim
✔ User should get the correct tokens on deposit again (140ms)
✔ User should get the correct tokens on multiple deposit/withdraw too (320ms)

Audit Comments

We recommend you to use the special form of comments (NatSpec Format, Follow link for more information https://docs.soliditylang.org/en/v0.5.10/natspec-format.html) for your contracts to provide rich documentation for functions, return variables and more. This helps investors to make clear what that variables, functions etc. do.

20. March 2022:

- Read whole report for more information

23. March 2022:

- All bugs has been fixed by the vEmpire team
- Read whole report for more information

SWC Attacks

ID	Title	Relationships	Status
SWC-136	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
SWC-135	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
SWC-134	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
SWC-133	Hash Collisions With Multiple Variable Length Arguments	CWE-294: Authentication Bypass by Capture-replay	PASSED
SWC-132	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
SWC-131	Presence of unused variables	CWE-1164: Irrelevant Code	PASSED
SWC-130	Right-To-Left-Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
SWC-129	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
SWC-128	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SWC-127	Arbitrary Jump with Function Type Variable	CWE-695: Use of Low-Level Functionality	PASSED
SWC-125	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
SWC-124	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
SWC-123	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
SWC-122	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
SWC-121	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
SWC-120	Weak Sources of Randomness from Chain Attributes	CWE-330: Use of Insufficiently Random Values	PASSED
SWC-119	Shadowing State Variables	CWE-710: Improper Adherence to Coding Standards	PASSED
SWC-118	Incorrect Constructor Name	CWE-665: Improper Initialization	PASSED
SWC-117	Signature Malleability	CWE-347: Improper Verification of Cryptographic Signature	PASSED

SWC-116	Timestamp Dependence	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SWC-115	Authorization through tx.origin	CWE-477: Use of Obsolete Function	PASSED
SWC-114	Transaction Order Dependence	CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')	PASSED
SWC-113	DoS with Failed Call	CWE-703: Improper Check or Handling of Exceptional Conditions	PASSED
SWC-112	Delegatecall to Untrusted Callee	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SWC-111	Use of Deprecated Solidity Functions	CWE-477: Use of Obsolete Function	PASSED
SWC-110	Assert Violation	CWE-670: Always-Incorrect Control Flow Implementation	PASSED
SWC-109	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
SWC-108	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED
SWC-107	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SWC-106	Unprotected SELFDESTRUCT Instruction	CWE-284: Improper Access Control	PASSED

SWC-105	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
SWC-104	Unchecked Call Return Value	CWE-252: Unchecked Return Value	PASSED
SWC-103	Floating Pragma	CWE-664: Improper Control of a Resource Through its Lifetime	PASSED
SWC-102	Outdated Compiler Version	CWE-937: Using Components with Known Vulnerabilities	PASSED
SWC-101	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
SWC-100	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED

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