Smart Contract
Security Audit
V1

Kitten Club House NFT Smart Contract

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Background

The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Project Information

- **Platform**: Ethereum
- **Contract Address**: 0x8B224aCDB4ECc76433D9b2c33a8c2a56CA452c85
- **Code:**

https://github.com/Saferico/Smart-Contracts-for-Projects/blob/main/KittenClubHouse.sol

NFT Information

- Name: KCH
- MAX Supply: 1200 , Presale Supply: 1000
- Holders:
- Total transactions:

Contracts address deployed to test net (Ethereum)

Kitten Club House NFT contract on ETH test net to test every function by the auditor.

https://rinkeby.etherscan.io/address/0x8b224acdb4ecc76433d9b2c33a8c2a56ca452c85

Executive Summary

According to our assessment, the customer`s solidity smart contract is **Well-Secured**. Because the team fix all high and low issues.

Well Secured	✓
Secured	
Poor Secured	
Insecure	

Automated checks are with remix IDE. All issues were performed by the team, which included the analysis of code functionality, manual audit found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the audit overview section. The general overview is presented in the Project Information section and all issues found are located in the audit overview section.

Team found 0 critical, 1 high, 0 medium, 3 low, 0 very low-level issues and 1 note in all solidity files of the contract

The files:

KittenClubHouse.sol

File and Function Level Report

File in Scope:

Contract Name	SHA 256 hash	Contract Address
KittenClubHouse.sol	**a7408d7b08fd6b6b94ddb705e4a3b7def1094e825d1049586d76bf0b0f5049af**	0x8B224aCDB4ECc76433D9b2c33a8c2a56CA452c85

- Contract: KittenClubHouse
- Inherit: ERC721A, Ownable, Pausable, ReentrancyGuard
- Observation: All passed including security check
- Test Report: passed
- Score: passed
- Conclusion: passed

Function	Test Result	Type / Return Type	Score
name	✓	Read / public	**Passed**
symbol	✓	Read / public	**Passed**
KCH_PROVENANCE	✓	Read / public	**Passed**
supportsInterface	✓	Read / public	**Passed**
maxMintPerWallet	✓	Read / public	**Passed**
balanceOf	✓	Read / public	**Passed**
Owner	✓	Read / public	**Passed**
getPrice	✓	Read / public	**Passed**
whitelistMerkleRoot	✓	Read / public	**Passed**
getApprovedForAll	✓	Read / public	**Passed**
revealed	✓	Read / public	**Passed**
getApproved	✓	Read / public	**Passed**

ownerOf	✓	Read / public	**Passed**
tokenURI	✓	Read / public	**Passed**
totalSupply	✓	Read / public	**Passed**
maxMintPerTx	✓	Read / public	**Passed**
maxTokens	✓	Read / public	**Passed**
presalePrice	✓	Read / public	**Passed**
price	✓	Read / public	**Passed**
reservedTokens	✓	Read / public	**Passed**
presaleTokens	✓	Read / public	**Passed**
saleState	✓	Read / public	**Passed**
paused	✓	Read / public	**Passed**
mintedPerWallet	✓	Read / public	**Passed**
mintWhitelist	✓	Write / payable	**Passed**
approve	✓	Write / public	**Passed**
safeTransferFrom	✓	Write / public	**Passed**
safeTransferFrom	✓	Write / public	**Passed**
setMaxMintPerTx	✓	Write / public	**Passed**
revealTokens	✓	Write / public	**Passed**
mintNFT	✓	Write / payable	**Passed**
setMaxMintPerWallet	✓	Write / public	**Passed**
transferOwnership	✓	Write / public	**Passed**
setApprovalForAll	✓	Write / public	**Passed**
transferFrom	✓	Write / public	**Passed**
withdrawBalance	✓	Write / payable	**Passed**
setBaseURI	✓	Write / public	**Passed**
renounceOwnership	✓	Write / public	**Passed**
setReservedTokens	✓	Write / public	**Passed**

setPresalePrice	✓	Write / public	**Passed**
setPresaleTokens	✓	Write / public	**Passed**
setPublicSalePrice	✓	Write / public	**Passed**
setWithdrawalDistrubution	✓	Write / public	**Passed**
setWhitelistMerkleRoot	✓	Write / public	**Passed**
airdropNFT	✓	Write / public	**Passed**
endPresale	✓	Write / public	**Passed**
startPresale	✓	Write / public	**Passed**
startPublicSale	✓	Write / public	**Passed**
unpaused	✓	Write / public	**Passed**

Issues Checking Status

No.	Issue Description	Checking Status
1	Compiler warnings.	**Passed**
2	Race conditions and Reentrancy. Cross-function race conditions.	**Passed**
3	Possible delays in data delivery.	**Passed**
4	Oracle calls.	**Passed**
5	Design Logic.	**Passed**
6	Timestamp dependence.	**Passed**
7	Integer Overflow and Underflow.	**Passed**
8	DoS with Revert.	**Passed**
9	DoS with block gas limit.	**Passed with Notes**
10	Methods execution permissions.	**Passed**
11	Economy model. If application logic is based on an incorrect economic model, the application would not function correctly and participants would incur financial losses. This type of issue is most often found in bonus rewards systems, Staking and Farming contracts, Vault and Vesting contracts, etc.	**Passed**
12	The impact of the exchange rate on the logic.	**Passed**
13	Private user data leaks.	**Passed**
14	Malicious Event log.	**Passed**
15	Scoping and Declarations.	**Passed**
16	Uninitialized storage pointers.	**Passed**
17	Arithmetic accuracy.	**Passed**

Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to tokens loss etc.
High	High-level vulnerabilities are difficult to exploit; however, they also have significant impact on smart contract execution, e.g. public access to crucial functions
Medium	Medium-level vulnerabilities are important to fix; however, they can’t lead to tokens lose
Low	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can’t have significant impact on execution
Note	Lowest-level vulnerabilities, code style violations and info statements can’t affect smart contract execution and can be ignored.

Audit Findings

Critical:

No Critical severity vulnerabilities were found.

High:

#Contract code size exceeds 24576 bytes

Description
Contract implementation is too large in size to be deployed on main net. Ethereum with its spurious dragon release limited the size of the contracts deployable on main net to 24576 bytes.
The size of the contract KittenClubHouse.sol goes way above this value.
You can read more here:
https://github.com/ethereum/EIPs/issues/170

Remediation
Define and use libraries for pure and view functions e.g. We can create a library which contains all the mathematical operations.

Status: Closed. Fixed in version 2.

Medium:

No Medium severity vulnerabilities were found

Low:

#Pragam version not fixed

Description
It is a good practice to lock the solidity version for a live deployment (use 0.8.7 instead of ^0.8.7). contracts should be deployed with the same compiler version and flags that they have been tested the most with. Locking the pragma helps ensure that contracts do not accidentally get deployed using, for example, the latest compiler which may have higher risks of undiscovered bugs. Contracts may also be deployed by others and the pragma indicates the compiler version intended by the original authors.

Remediation
Remove the ^ sign to lock the pragma version.

Status: Closed. Fixed in version2

#Missing zero address validation

Description

When the owner wants to airdrop for the investors it has to check for the zero address to make, he didn't mint for the burn address. Otherwise, the mint function will act like the burn function.

```
function airdropNft(uint256 _amount, address _to) external onlyOwner {
        safeMintNfts(_amount, _to);
    }
```

Remediation

Use the require statement to check for zero addresses.

```
require(_to != address(0), "Not Mint for the zero address");
```

Status: Closed. Fixed in version2.

#Owner privileges (In the period when the owner isn't renounced)

Description

The owner can pause and un Pause mint.

The owner can change the price in Presale and public stage.

```
function pause() external onlyOwner whenNotPaused {
        _pause();
    }

    function unpause() external onlyOwner whenPaused {
        _unpause();
    }

    function setPresalePrice(uint256 _price) external onlyOwner {
        presalePrice = _price;
    }

    function setPublicSalePrice(uint256 _price) external onlyOwner {
        price = _price;
    }
```

Remediation

Make these functions internal in next version or the team should announce the investors before pause and un pause to give them time if they want to do anything.

P.S: This issue is common to the majority of NFT smart contracts.

Very Low:

No Very Low severity vulnerabilities were found.

Notes:

#Unnecessary import of String library

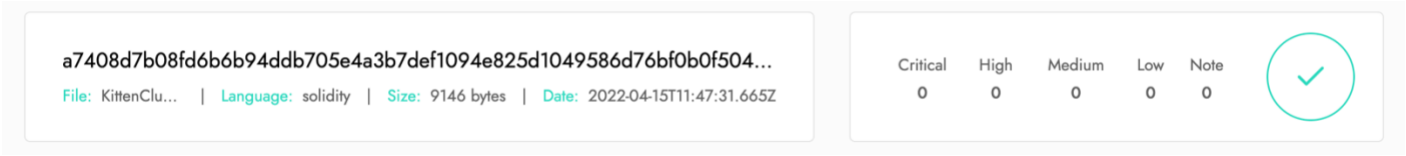
Description
The main contract inherits: ERC721A, Ownable, Pausable, Reentrancy Guard, ERC721A which is already import String library, so no need to import it again in the main contract.

Remediation
Remove unnecessary library from the main contract save some gas fees.

Status: Closed. Fixed in version2.

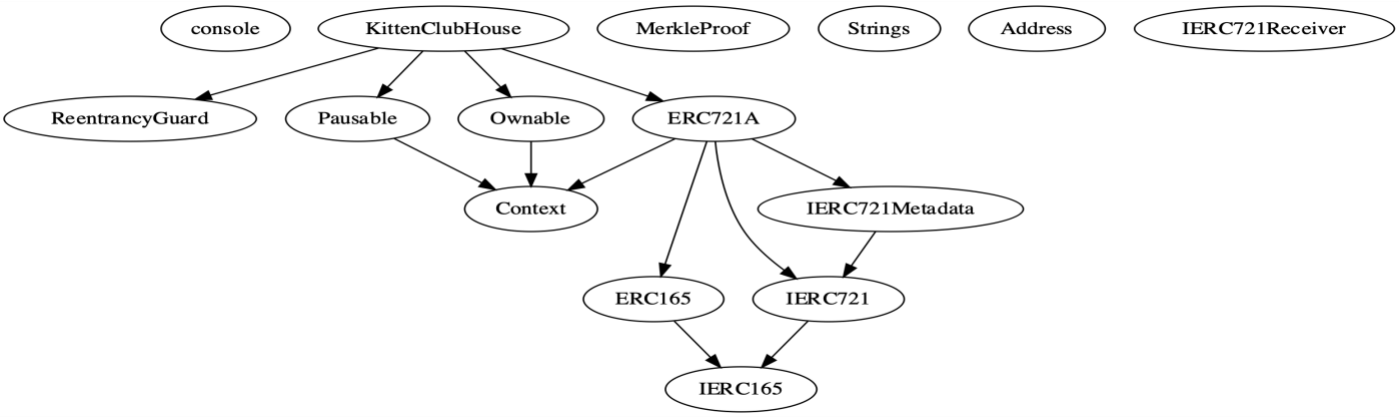
Automatic Testing

1- Check for security

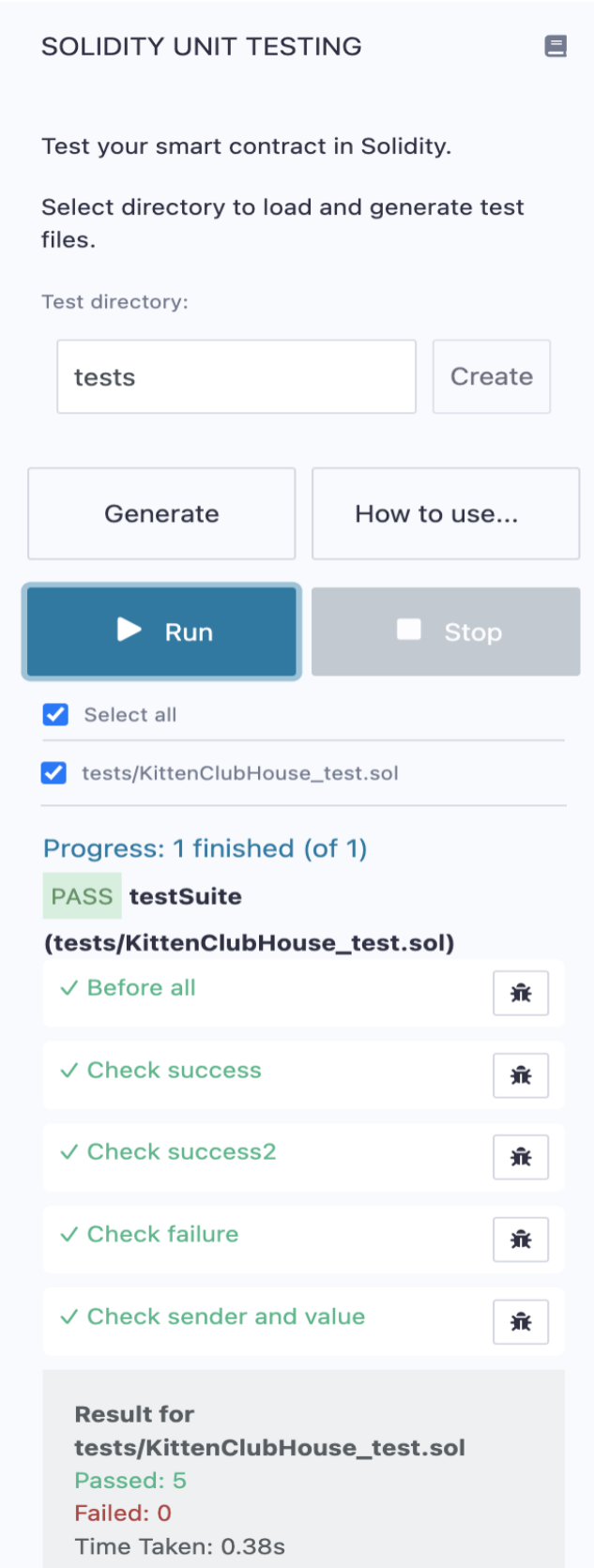


2- SOLIDITY STATIC ANALYSIS

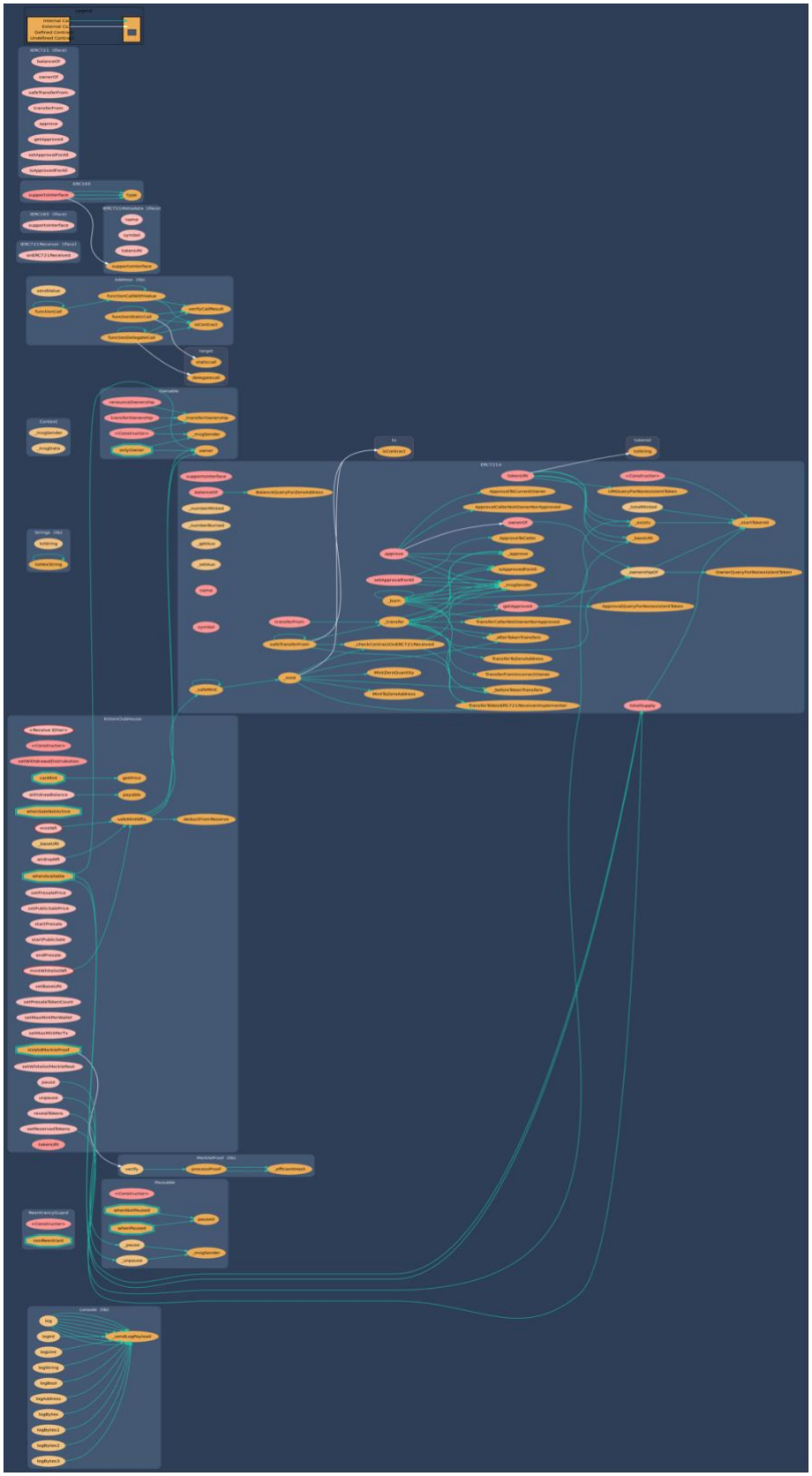
3- Inheritance graph



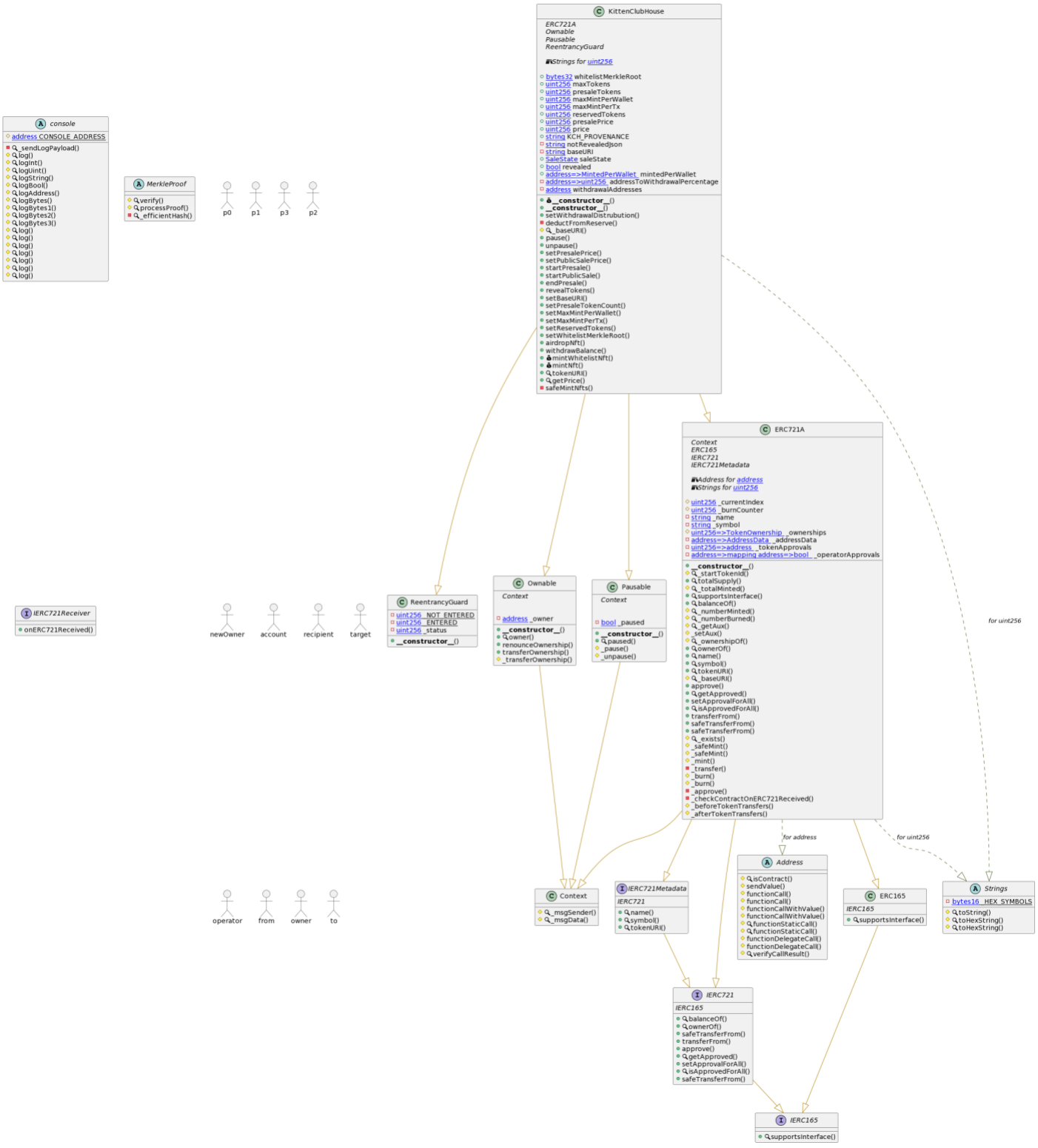
4- SOLIDITY UNIT TESTING



5- Call graph



Unified Modeling Language (UML)



Functions signature

```
Sighash   |   Function Signature
========================
16279055  =>  isContract(address)
47ee4fe3  =>  _sendLogPayload(bytes)
51973ec9  =>  log()
6525b5f5  =>  logInt(int256)
9905b744  =>  logUint(uint256)
0bb563d6  =>  logString(string)
ba7ab84e  =>  logBool(bool)
5f91b0af  =>  logAddress(address)
e17bf956  =>  logBytes(bytes)
6f4171c9  =>  logBytes1(bytes1)
9b5e943e  =>  logBytes2(bytes2)
7782fa2d  =>  logBytes3(bytes3)
aa6540c8  =>  log(address,address,bool,string)
2cd4134a  =>  log(address,address,bool,bool)
9f1bc36e  =>  log(address,address,bool,address)
94250d77  =>  log(address,address,address,uint256)
f808da20  =>  log(address,address,address,string)
0e378994  =>  log(address,address,address,bool)
665bf134  =>  log(address,address,address,address)
5a9a49c7  =>  verify(bytes32[],bytes32,bytes32)
62702a6b  =>  processProof(bytes32[],bytes32)
41ed615b  =>  _efficientHash(bytes32,bytes32)
6900a3ae  =>  toString(uint256)
8fba8d5c  =>  toHexString(uint256)
63e1cbea  =>  toHexString(uint256,uint256)
119df25f  =>  _msgSender()
8b49d47e  =>  _msgData()
5c975abb  =>  paused()
320b2ad9  =>  _pause()
fc8234cb  =>  _unpause()
8da5cb5b  =>  owner()
715018a6  =>  renounceOwnership()
f2fde38b  =>  transferOwnership(address)
d29d44ee  =>  _transferOwnership(address)
24a084df  =>  sendValue(address,uint256)
a0b5ffb0  =>  functionCall(address,bytes)
241b5886  =>  functionCall(address,bytes,string)
2a011594  =>  functionCallWithValue(address,bytes,uint256)
d525ab8a  =>  functionCallWithValue(address,bytes,uint256,string)
c21d36f3  =>  functionStaticCall(address,bytes)
dbc40fb9  =>  functionStaticCall(address,bytes,string)
ee33b7e2  =>  functionDelegateCall(address,bytes)
57387df0  =>  functionDelegateCall(address,bytes,string)
946b5793  =>  verifyCallResult(bool,bytes,string)
150b7a02  =>  onERC721Received(address,address,uint256,bytes)
01ffc9a7  =>  supportsInterface(bytes4)
70a08231  =>  balanceOf(address)
6352211e  =>  ownerOf(uint256)
42842e0e  =>  safeTransferFrom(address,address,uint256)
23b872dd  =>  transferFrom(address,address,uint256)
095ea7b3  =>  approve(address,uint256)
```

```
081812fc  =>  getApproved(uint256)
a22cb465  =>  setApprovalForAll(address,bool)
e985e9c5  =>  isApprovedForAll(address,address)
b88d4fde  =>  safeTransferFrom(address,address,uint256,bytes)
06fdde03  =>  name()
95d89b41  =>  symbol()
c87b56dd  =>  tokenURI(uint256)
98995f77  =>  _startTokenId()
18160ddd  =>  totalSupply()
736bf591  =>  _totalMinted()
4d388a98  =>  _numberMinted(address)
6ba1b8d0  =>  _numberBurned(address)
f4a540c5  =>  _getAux(address)
4ff8c452  =>  _setAux(address,uint64)
fb372cf2  =>  _ownershipOf(uint256)
743976a0  =>  _baseURI()
f8e76cc0  =>  _exists(uint256)
b3e1c718  =>  _safeMint(address,uint256)
6a4f832b  =>  _safeMint(address,uint256,bytes)
de0d9900  =>  _mint(address,uint256,bytes,bool)
30e0789e  =>  _transfer(address,address,uint256)
9b1f9e74  =>  _burn(uint256)
834a9477  =>  _burn(uint256,bool)
f272404d  =>  _approve(address,uint256,address)
d88343e2  =>  _checkContractOnERC721Received(address,address,uint256,bytes)
ef435773  =>  _beforeTokenTransfers(address,address,uint256,uint256)
08c018f7  =>  _afterTokenTransfers(address,address,uint256,uint256)
34a8d3ce  =>  setWithdrawalDistrubution(address[],uint256[])
ce511fa2  =>  deductFromReserve(uint256)
8456cb59  =>  pause()
3f4ba83a  =>  unpause()
3549345e  =>  setPresalePrice(uint256)
791a2519  =>  setPublicSalePrice(uint256)
04c98b2b  =>  startPresale()
0c1c972a  =>  startPublicSale()
a43be57b  =>  endPresale()
3ba5939d  =>  revealTokens()
55f804b3  =>  setBaseURI(string)
c0e65a70  =>  setPresaleTokenCount(uint256)
afdf6134  =>  setMaxMintPerWallet(uint256)
616cdb1e  =>  setMaxMintPerTx(uint256)
027903ef  =>  setReservedTokens(uint256)
bd32fb66  =>  setWhitelistMerkleRoot(bytes32)
a8115b0c  =>  airdropNft(uint256,address)
5fd8c710  =>  withdrawBalance()
a4187678  =>  mintWhitelistNft(uint256,bytes32[])
0d730acc  =>  mintNft(uint256)
98d5fdca  =>  getPrice()
aa8a452e  =>  safeMintNfts(uint256,address)
```

Automatic general report

Files Description Table

File Name	SHA-1 Hash
/Users/macbook/Desktop/smart contracts/KittenClubHouse.sol	c7a35493a63ef7b27c5fd5b93d61441219afa53d

Contracts Description Table

Contract	Type	Bases		
└	**Function Name**	**Visibility**	**Mutability**	**Modifiers**
console	Library			
└	_sendLogPayload	Private 🔐		
└	log	Internal 🔒		
└	logInt	Internal 🔒		
└	logUint	Internal 🔒		
└	logString	Internal 🔒		
└	logBool	Internal 🔒		
└	logAddress	Internal 🔒		
└	logBytes	Internal 🔒		
└	logBytes1	Internal 🔒		
└	logBytes2	Internal 🔒		
└	logBytes3	Internal 🔒		
└	log	Internal 🔒		
└	log	Internal 🔒		
└	log	Internal 🔒		
└	log	Internal 🔒		
└	log	Internal 🔒		
└	log	Internal 🔒		
└	log	Internal 🔒		
ReentrancyGuard	Implementation			
└	<Constructor>	Public ❗	🛑	NO❗
MerkleProof	Library			
└	verify	Internal 🔒		
└	processProof	Internal 🔒		
└	_efficientHash	Private 🔐		
Strings	Library			
└	toString	Internal 🔒		
└	toHexString	Internal 🔒		
└	toHexString	Internal 🔒		
Context	Implementation			
└	_msgSender	Internal 🔒		
└	_msgData	Internal 🔒		


Pausable	Implementation	Context		
└	<Constructor>	Public ❗	🛑	NO❗
└	paused	Public ❗		NO❗
└	_pause	Internal 🔒	🛑	whenNotPaused
└	_unpause	Internal 🔒	🛑	whenPaused
Ownable	Implementation	Context		
└	<Constructor>	Public ❗	🛑	NO❗
└	owner	Public ❗		NO❗
└	renounceOwnership	Public ❗	🛑	onlyOwner
└	transferOwnership	Public ❗	🛑	onlyOwner
└	_transferOwnership	Internal 🔒	🛑	
Address	Library		
└	isContract	Internal 🔒		
└	sendValue	Internal 🔒	🛑	
└	functionCall	Internal 🔒	🛑	
└	functionCall	Internal 🔒	🛑	
└	functionCallWithValue	Internal 🔒	🛑	
└	functionCallWithValue	Internal 🔒	🛑	
└	functionStaticCall	Internal 🔒		
└	functionStaticCall	Internal 🔒		
└	functionDelegateCall	Internal 🔒	🛑	
└	functionDelegateCall	Internal 🔒	🛑	
└	verifyCallResult	Internal 🔒		
IERC721Receiver	Interface		
└	onERC721Received	External ❗	🛑	NO❗
IERC165	Interface		
└	supportsInterface	External ❗		NO❗
ERC165	Implementation	IERC165		
└	supportsInterface	Public ❗		NO❗
IERC721	Interface	IERC165		
└	balanceOf	External ❗		NO❗
└	ownerOf	External ❗		NO❗
└	safeTransferFrom	External ❗	🛑	NO❗
└	transferFrom	External ❗	🛑	NO❗
└	approve	External ❗	🛑	NO❗
└	getApproved	External ❗		NO❗
└	setApprovalForAll	External ❗	🛑	NO❗
└	isApprovedForAll	External ❗		NO❗
└	safeTransferFrom	External ❗	🛑	NO❗
IERC721Metadata	Interface	IERC721		
└	name	External ❗		NO❗
└	symbol	External ❗		NO❗
└	tokenURI	External ❗		NO❗
ERC721A	Implementation	Context, ERC165, IERC721, IERC721Metadata		
└	<Constructor>	Public ❗	🛑	NO❗
└	_startTokenId	Internal 🔒		

└	totalSupply	Public ❗		NO❗
└	_totalMinted	Internal 🔒		
└	supportsInterface	Public ❗		NO❗
└	balanceOf	Public ❗		NO❗
└	_numberMinted	Internal 🔒		
└	_numberBurned	Internal 🔒		
└	_getAux	Internal 🔒		
└	_setAux	Internal 🔒	🛑	
└	_ownershipOf	Internal 🔒		
└	ownerOf	Public ❗		NO❗
└	name	Public ❗		NO❗
└	symbol	Public ❗		NO❗
└	tokenURI	Public ❗		NO❗
└	_baseURI	Internal 🔒		
└	approve	Public ❗	🛑	NO❗
└	getApproved	Public ❗		NO❗
└	setApprovalForAll	Public ❗	🛑	NO❗
└	isApprovedForAll	Public ❗		NO❗
└	transferFrom	Public ❗	🛑	NO❗
└	safeTransferFrom	Public ❗	🛑	NO❗
└	safeTransferFrom	Public ❗	🛑	NO❗
└	_exists	Internal 🔒		
└	_safeMint	Internal 🔒	🛑	
└	_safeMint	Internal 🔒	🛑	
└	_mint	Internal 🔒	🛑	
└	_transfer	Private 🔐	🛑	
└	_burn	Internal 🔒	🛑	
└	_burn	Internal 🔒	🛑	
└	_approve	Private 🔐	🛑	
└	_checkContractOnERC721Received	Private 🔐	🛑	
└	_beforeTokenTransfers	Internal 🔒	🛑	
└	_afterTokenTransfers	Internal 🔒	🛑	
KittenClubHouse	Implementation	ERC721A, Ownable, Pausable, ReentrancyGuard		
└	<Receive Ether>	External ❗	💸	NO❗
└	<Constructor>	Public ❗	🛑	ERC721A
└	setWithdrawalDistrubution	Public ❗	🛑	onlyOwner
└	deductFromReserve	Private 🔐	🛑	
└	_baseURI	Internal 🔒		
└	pause	External ❗	🛑	onlyOwner whenNotPaused
└	unpause	External ❗	🛑	onlyOwner whenPaused
└	setPresalePrice	External ❗	🛑	onlyOwner
└	setPublicSalePrice	External ❗	🛑	onlyOwner
└	startPresale	External ❗	🛑	onlyOwner whenSaleNotActive
└	startPublicSale	External ❗	🛑	onlyOwner whenSaleNotActive
└	endPresale	External ❗	🛑	onlyOwner
└	revealTokens	External ❗	🛑	onlyOwner
└	setBaseURI	External ❗	🛑	onlyOwner
└	setPresaleTokenCount	External ❗	🛑	onlyOwner
└	setMaxMintPerWallet	External ❗	🛑	onlyOwner
└	setMaxMintPerTx	External ❗	🛑	onlyOwner
└	setReservedTokens	External ❗	🛑	onlyOwner
└	setWhitelistMerkleRoot	External ❗	🛑	onlyOwner
└	airdropNft	External ❗	🛑	onlyOwner

└	withdrawBalance	External ❗	🛑	onlyOwner
└	mintWhitelistNft	External ❗	🅿️	whenNotPaused nonReentrant isValidMerkleProof canMint
└	mintNft	External ❗	🅿️	whenNotPaused canMint
└	tokenURI	Public ❗		NO❗
└	getPrice	Public ❗		NO❗
└	safeMintNfts	Private 🔐	🛑	whenAvailable

Legend

Symbol	Meaning
🛑	Function can modify state
🅿️	Function is payable

Conclusion

The contracts are written systematically. Team found no critical issues. So, it is good to go for production.

Since possible test cases can be unlimited and developer level documentation (code flow diagram with function level description) not provided, for such an extensive smart contract protocol, we provide no such guarantee of future outcomes. We have used all the latest static tools and manual observations to cover maximum possible test cases to scan Everything.

Security state of the reviewed contract is “ Well Secured”.

✓ No volatile code.
✓ Not many high severity issues were found.

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as of the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against the team on the basis of what it says or doesn't say, or how team produced it, and it is important for you to conduct your own independent investigations before making any decisions. team go into more detail on this in the below disclaimer below – please make sure to read it in full.

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