



Proof of Play / Pirate Nation

Smart Contract Security Audit

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Visit: Halborn.com

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DOCUMENT REVISION HISTORY

VERSION	MODIFICATION	DATE	AUTHOR
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0.2	Document Updates	05/16/2022	Roberto Reigada
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1.0	Remediation Plan	06/02/2022	Roberto Reigada
1.1	Remediation Plan Review	06/02/2022	Gabi Urrutia
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2.3	Draft Review	08/22/2022	Gabi Urrutia
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3.1	Remediation Plan Review	09/16/2022	Gabi Urrutia
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4.2	Updated the scope	11/14/2022	Roberto Reigada
4.3	Updated the scope	11/28/2022	Roberto Reigada
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4.5	Final Review	11/28/2022	Gabi Urrutia
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5.1	Final Review	12/07/2022	Roberto Reigada
5.2	Final Review	12/07/2022	Piotr Cielas
5.3	Final Review	12/07/2022	Gabi Urrutia

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EXECUTIVE OVERVIEW

1.1 INTRODUCTION

Proof of Play engaged Halborn to conduct a security audit on their smart contracts beginning on April 25th, 2022 and ending on May 16th, 2022. This initial audit included the [v0.0.4](#) of the Proof of Play contracts. After Proof of Play addressed all the issues found during the audit, Halborn reaudited all the new code changes introduced. These code changes were covered in the [v0.0.9 version](#).

After this initial audit, Proof of Play performed multiple updates in the code and requested a new audit on the 16th of July 2022. A new audit was performed by Halborn which included all the contracts in the Commit ID: [f5c3190140139941351a68da617a91315487e917](#).

Some small code changes were introduced in the contracts previously audited, plus these 4 new contracts were added to the code base:

- [LootSystem.sol](#)
- [HoldingSystem.sol](#)
- [QuestSystem.sol](#)
- [GameGlobals.sol](#)

Moreover, Halborn kept auditing Proof of Play contracts as their development phase was progressing. The following contracts were also added to the scope of the audit:

[c49710da0cfa94e2b3bee730bf980a89a059a700](#)

- [CraftingSystem.sol](#)

[05007dcea3bf1f7f05b53f3d6a0cba04bc7032a0](#)

- [EnergySystem.sol](#)

[aedd5dbab65f96b452b5df0627bb562d8db8e41a](#)

- [CaptainSystem.sol](#)

1.2 AUDIT SUMMARY

The team at Halborn was provided three weeks for the initial audit and assigned a full-time security engineer to audit the security of the smart contracts. The security engineer is a blockchain and smart-contract security expert with advanced penetration testing, smart-contract hacking, and deep knowledge of multiple blockchain protocols. Multiple audits were done by the same engineer in a time frame of several months. The smart contracts were audited in the development phase of the project, every time a new change was introduced into the code base.

The purpose of the audits is to:

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

In summary, during the audits, Halborn identified some security risks that were mostly addressed and acknowledged by [Proof of Play team](#).

1.3 TEST APPROACH & METHODOLOGY

Halborn performed a combination of manual and automated security testing to balance efficiency, timeliness, practicality, and accuracy in regard to the scope of this audit. While manual testing is recommended to uncover flaws in logic, process, and implementation; automated testing techniques help enhance coverage of the code and can quickly identify items that do not follow the security best practices. The following phases and associated tools were used during the audit:

- Research into architecture and purpose
- Smart contract manual code review and walkthrough
- Graphing out functionality and contract logic/connectivity/functions ([solgraph](#))

- Manual assessment of use and safety for the critical Solidity variables and functions in scope to identify any arithmetic related vulnerability classes
- Manual testing by custom scripts
- Scanning of solidity files for vulnerabilities, security hot-spots or bugs. ([MythX](#))
- Static Analysis of security for scoped contract, and imported functions. ([Slither](#))
- Testnet deployment ([Brownie](#), [Remix IDE](#))

RISK METHODOLOGY:

Vulnerabilities or issues observed by Halborn are ranked based on the risk assessment methodology by measuring the **LIKELIHOOD** of a security incident and the **IMPACT** should an incident occur. This framework works for communicating the characteristics and impacts of technology vulnerabilities. The quantitative model ensures repeatable and accurate measurement while enabling users to see the underlying vulnerability characteristics that were used to generate the Risk scores. For every vulnerability, a risk level will be calculated on a scale of 5 to 1 with 5 being the highest likelihood or impact.

RISK SCALE - LIKELIHOOD

- 5 - Almost certain an incident will occur.
- 4 - High probability of an incident occurring.
- 3 - Potential of a security incident in the long term.
- 2 - Low probability of an incident occurring.
- 1 - Very unlikely issue will cause an incident.

RISK SCALE - IMPACT

- 5 - May cause devastating and unrecoverable impact or loss.
- 4 - May cause a significant level of impact or loss.
- 3 - May cause a partial impact or loss to many.
- 2 - May cause temporary impact or loss.
- 1 - May cause minimal or un-noticeable impact.

The risk level is then calculated using a sum of these two values, creating a value of 10 to 1 with 10 being the highest level of security risk.

CRITICAL	HIGH	MEDIUM	LOW	INFORMATIONAL
----------	------	--------	-----	---------------

10 - CRITICAL

9 - 8 - HIGH

7 - 6 - MEDIUM

5 - 4 - LOW

3 - 1 - VERY LOW AND INFORMATIONAL

1.4 SCOPE

IN-SCOPE:

The security assessment was scoped to the following smart contracts:

- ERC721BridgableChild.sol
- ERC721BridgableParent.sol
- ERC721Lockable.sol
- ERC1155Lockable.sol
- GameItems.sol
- GameNFT.sol
- GameRegistry.sol
- GameRegistryConsumer.sol
- GoldToken.sol
- LockingSystem.sol
- PirateGameV1.sol
- PirateNFT.sol
- PirateNFTParent.sol
- RaffleMintV1.sol
- Randomizer.sol
- StakingSystem.sol
- TraitsConsumer.sol
- TraitsProvider.sol
- StagedMintV1.sol
- LootSystem.sol
- HoldingSystem.sol
- QuestSystem.sol
- GameGlobals.sol
- CraftingSystem.sol
- EnergySystem.sol
- CaptainSystem.sol

Initial audit version:

- v0.0.4

Fixed version:

- v0.0.9

Second audit Commit ID:

- [f5c3190140139941351a68da617a91315487e917](#)

Contracts added to the scope of this audit:

- (Code changes from previously audited contracts)
- [LootSystem.sol](#)
- [HoldingSystem.sol](#)
- [QuestSystem.sol](#)
- [GameGlobals.sol](#)

Third audit Commit ID:

- [c49710da0cfa94e2b3bee730bf980a89a059a700](#)

Contracts added to the scope of this audit:

- (Code changes from previously audited contracts)
- [CraftingSystem.sol](#)

Fourth audit Commit ID:

- [05007dcea3bf1f7f05b53f3d6a0cba04bc7032a0](#)

Contracts added to the scope of this audit:

- (Code changes from previously audited contracts)
- [EnergySystem.sol](#)

Fifth audit Commit ID:

- [888ea7ac11564e981171d1b6bf671c289bee746b](#)

Added code fixes to some of the previously found issues to this Commit ID.

Sixth audit Commit ID:

- [856d14f0eb2b1ebbeca937ba202f9b0d74a361c6](#)

Addition of the Delegated Transactions feature. No issues were found on this feature.

Seventh audit Commit ID:

- [eda67de3e770079146b4f26230385fbb03cb6a35](#)

Addition of the [giveEnergy\(\)](#) and [TokenActions](#) function.

Added some minting restrictions to the [StagedMintV1](#) contract.

No new issues were found on this Commit ID.

Eighth audit Commit ID:

- e144751a79d371a8444c41b355201c753df99695

No new issues were found on this Commit ID.

Ninth audit Commit ID:

- 99250171609c4311a3392fb6d44b1de8451a835

Added code fixes to some of the previously found issues to this commit ID.

Tenth audit Commit ID:

- 436dcee1b541a8ed9a29f3b5b6fe099de8f81ce6

No new issues were found on this Commit ID.

Eleventh audit Commit ID:

- aedd5dbab65f96b452b5df0627bb562d8db8e41a

No new issues were found on this Commit ID.

Twelfth audit Commit IDs:

- 12336c2ccbba8850dd5dc27d4ace187914230b77

- 7ad0148caf0d93896209f8e40f26b5738974118e

- bcca0b23cb776f7b4bedf1965b481ff732db733f

No new issues were found on these Commit IDs.

2. ASSESSMENT SUMMARY & FINDINGS OVERVIEW

CRITICAL	HIGH	MEDIUM	LOW	INFORMATIONAL
2	5	4	3	9

LIKELIHOOD

	(HAL-11)	(HAL-04) (HAL-05) (HAL-07)	(HAL-03)	(HAL-01) (HAL-02)
			(HAL-06)	
(HAL-12) (HAL-14)	(HAL-13)			
				(HAL-08) (HAL-09) (HAL-10)
(HAL-15) (HAL-16) (HAL-17) (HAL-18) (HAL-19) (HAL-20) (HAL-21) (HAL-22) (HAL-23)				

EXECUTIVE OVERVIEW

SECURITY ANALYSIS	RISK LEVEL	REMEDIATION DATE
HAL01 - USERS CAN START A QUEST USING AS INPUT AND BURNING AN NFT THEY DO NOT OWN	Critical	SOLVED - 09/10/2022
HAL02 - FLAWED LOGIC CAUSES THAT NAVIES WILL NEVER STEAL PIRATE'S GOLD	Critical	SOLVED - 06/02/2022
HAL03 - UNSAFE CAST CAN ALLOW USERS TO PERMANENTLY MINT GOLD TOKENS	High	SOLVED - 06/02/2022
HAL04 - REENTRANCY IN RAFFLEMINTV1.WITHDRAWNONRAFFLEPROCEED	High	SOLVED - 06/02/2022
HAL05 - USERS CAN START THE SAME QUEST MULTIPLE TIMES DRAINING THE CHAINLINK VRF SUBSCRIPTION	High	RISK ACCEPTED
HAL06 - USERS CAN CRAFT USING AS INPUT AN NFT THEY DO NOT OWN	High	SOLVED - 09/10/2022
HAL07 - CRAFTAMOUNT CAN BE SET TO ZERO DRAINING THE CHAINLINK VRF SUBSCRIPTION	High	SOLVED - 09/10/2022
HAL08 - CRAFTS COOLDOWN TIME ARE ALWAYS ZERO	Medium	PARTIALLY SOLVED
HAL09 - QUESTDEFINITION.MAXCOMPLETIONS CAN BE BYPASSED BY STARTING THE SAME QUEST MULTIPLE TIMES BEFORE COMPLETING THEM	Medium	RISK ACCEPTED
HAL10 - LACK OF PAUSABLE FUNCTIONALITY IN THE LOOTSYSTEM CONTRACT	Medium	RISK ACCEPTED
HAL11 - MINTBATCH FUNCTION IS NOT IMPLEMENTED	Medium	RISK ACCEPTED
HAL12 - WRONG REQUIRE STATEMENTS IN GAMEGLOBALS CONTRACT	Low	SOLVED - 09/10/2022
HAL13 - QUESTINPUT.REQUIRED VALUE IS NEVER CHECKED	Low	RISK ACCEPTED

EXECUTIVE OVERVIEW

HAL14 - LACK OF DISABLEINITIALIZERS CALL TO PREVENT UNINITIALIZED CONTRACTS	Low	RISK ACCEPTED
HAL15 - USERS CAN NOT UNSTAKE NFTS AFTER A CALL TO RESCUEUNLOCKNFT OR RESCUEUNLOCKITEM FUNCTIONS	Informational	ACKNOWLEDGED
HAL16 - DANGEROUS USAGE OF TX.ORIGIN	Informational	ACKNOWLEDGED
HAL17 - STATE VARIABLES MISSING CONSTANT MODIFIER	Informational	SOLVED - 09/10/2022
HAL18 - STATE VARIABLES MISSING IMMUTABLE MODIFIER	Informational	SOLVED - 09/10/2022
HAL19 - UNNEEDED INITIALIZATION OF UINT256 VARIABLES TO 0	Informational	SOLVED - 09/10/2022
HAL20 - USING ++I CONSUMES LESS GAS THAN I++ IN LOOPS	Informational	SOLVED - 09/10/2022
HAL21 - UNNEEDED ARRAYS DECLARATION IN FINISHMINTSHIPS FUNCTION	Informational	SOLVED - 09/10/2022
HAL22 - MISSING VIEW FUNCTION THAT DISPLAYS ALL THE TICKETS OWNED BY A USER	Informational	SOLVED - 09/10/2022
HAL23 - INCORRECT COMMENT	Informational	ACKNOWLEDGED



FINDINGS & TECH DETAILS



3.1 (HAL-01) USERS CAN START A QUEST USING AS INPUT AND BURNING AN NFT THEY DO NOT OWN - CRITICAL

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

In the `QuestSystem` contract, the `startQuest()` function does not check that the NFT inputs are actually owned by the caller:

```
Listing 1: QuestSystem.sol (Lines 371-389)

305 function startQuest(QuestParams calldata params)
306     external
307     nonReentrant
308     whenNotPaused
309     returns (uint256)
310 {
311     QuestDefinition storage questDef = _questDefinitions[params.
↳ questId];
312     address account = _msgSender();
313
314     // Verify user can start this quest and meets requirements
315     require(
316         _isQuestAvailable(account, params.questId, questDef) ==
↳ true,
317         "QUEST_NOT_AVAILABLE: Sender cannot start this quest"
318     );
319     require(
320         params.inputs.length == questDef.inputs.length,
321         "INPUT_LENGTH_MISMATCH: Inputs to quest do not match to
↳ quest definition"
322     );
323
324     // Create active quest object
325     _activeQuestCounter.increment();
326     uint256 activeQuestId = _activeQuestCounter.current();
327 }
```

```
328     ActiveQuest storage activeQuest = _activeQuests[activeQuestId
329     ];
330     activeQuest.account = account;
331     activeQuest.questId = params.questId;
332     activeQuest.startTime = SafeCast.toInt32(block.timestamp);
333     activeQuest.status = ActiveQuestStatus.IN_PROGRESS;
334
335     // Track activeQuestId for this account
336     _accountData[account].activeQuestIds.add(activeQuestId);
337
338     // Verify that the params have inputs that meet the quest
339     // requirements
340     for (uint8 idx = 0; idx < questDef.inputs.length; idx++) {
341         QuestInput storage inputDef = questDef.inputs[idx];
342         GameRegistryLibrary.TokenPointer memory input = params.
343         inputs[idx];
344
345         // Make sure token types match
346         require(
347             input.tokenType == inputDef.tokenPointer.tokenType,
348             "TOKEN_TYPES_NOT_MATCHING: Token type is not matching
349             that expected by the quest"
350         );
351
352         // Make sure proper token address was provided
353         require(
354             inputDef.tokenPointer.tokenContract == address(0) ||
355             inputDef.tokenPointer.tokenContract == input.
356             tokenContract,
357             "EXPECTED_SPECIFIC_TOKEN: Expected a specific token
358             address"
359         );
360
361         GameRegistryLibrary.TokenType tokenType = inputDef
362             .tokenPointer
363             .tokenType;
364         uint32 reservationId = 0;
365
366         // Check token type to ensure that the input matches what
367         // the quest expects
368         if (tokenType == GameRegistryLibrary.TokenType.ERC20) {
369             require(
370                 _hasAccessRole(
```

```
364                     GameRegistryLibrary.  
365             GAME_CURRENCY_CONTRACT_ROLE,  
366             input.tokenContract  
367         ) == true,  
368         "NOT_GAME_CURRENCY: Expected GameCurrency contract  
369     );  
370  
371         // TODO: Find a way to either lock or burn ERC20 stuff  
372     } else if (tokenType == GameRegistryLibrary.TokenType.  
373     ERC721) {  
374         // Auto-Lock NFT if necessary  
375         ILockingSystem lockingSystem = _lockingSystem();  
376  
377         if (  
378             lockingSystem.isNFTLocked(  
379                 input.tokenContract,  
380                 input tokenId  
381             ) == false  
382         ) {  
383             lockingSystem.lockNFT(input.tokenContract, input.  
384             tokenId);  
385         }  
386  
387         reservationId = lockingSystem.addNFTReservation(  
388             input.tokenContract,  
389             input tokenId,  
390             true,  
391             GameRegistryLibrary.RESERVATION_QUEST_SYSTEM  
392         );  
393     } else if (tokenType == GameRegistryLibrary.TokenType.  
394     ERC1155) {  
395         reservationId = _lockingSystem().addItemReservation(  
396             account,  
397             input.tokenContract,  
398             input tokenId,  
399             input.amount,  
400             true,  
401             GameRegistryLibrary.RESERVATION_QUEST_SYSTEM  
402         );  
403     }  
404  
405     // Perform all trait checks  
406     for (
```

```

403         uint8 traitIdx = 0;
404         traitIdx < inputDef.traitChecks.length;
405         traitIdx++
406     ) {
407         TraitsLibrary.requireTraitCheck(
408             inputDef.traitChecks[traitIdx],
409             ITraitsConsumer(input.tokenContract),
410             input tokenId
411         );
412     }
413
414     activeQuest.inputs.push(
415         GameRegistryLibrary.ReservedToken({
416             tokenType: input.tokenType,
417             tokenId: input.tokenId,
418             tokenContract: input.tokenContract,
419             amount: input.amount,
420             reservationId: reservationId
421         })
422     );
423 }
424
425 emit QuestStarted(account, params.questId, activeQuestId);
426
427 return activeQuestId;
428 }
```

Moreover, when the quest inputs are unlocked upon quest completion in the `_unlockQuestInputs()` the NFT reservation is removed, but the NFT remains locked:

Listing 2: QuestSystem.sol (Lines 718-726)

```

656 function _unlockQuestInputs(
657     address account,
658     QuestDefinition storage questDef,
659     ActiveQuest storage activeQuest,
660     bool isSuccess,
661     uint256 randomWord
662 ) internal {
663     uint32 successXp = isSuccess ? questDef.successXp : 0;
664
665     // Unlock inputs, grant XP, and potentially burn inputs
```

```
666     for (uint8 idx = 0; idx < questDef.inputs.length; idx++) {
667         QuestInput storage input = questDef.inputs[idx];
668         GameRegistryLibrary.ReservedToken
669             storage activeQuestInput = activeQuest.inputs[idx];
670
671         // Grant XP on success
672         if (successXp > 0 && input.xpEarnedPercent > 0) {
673             uint32 xpAmount = (successXp * input.xpEarnedPercent)
674             /
675                 GameRegistryLibrary.PERCENTAGE_RANGE;
676
677             if (xpAmount > 0) {
678                 ITraitsConsumer(activeQuestInput.tokenContract)
679                     .incrementTrait(
680                         activeQuestInput tokenId,
681                         TraitsLibrary.XP_TRAIT_ID,
682                         xpAmount
683                     );
684             }
685
686             // Determine if the input should be burned
687             bool shouldBurn;
688
689             if (input.consumable) {
690                 uint256 burnRate = isSuccess
691                     ? input.successBurnRate
692                     : input.failureBurnRate;
693
694                 if (burnRate == 0) {
695                     shouldBurn = false;
696                 } else if (burnRate == GameRegistryLibrary.
697                 PERCENTAGE_RANGE) {
698                     shouldBurn = true;
699                 } else {
700                     randomWord = _nextRandomWord(randomWord);
701                     (shouldBurn, randomWord) = _weightedCoinFlip(
702                         randomWord,
703                         burnRate
704                     );
705                 }
706             }
707
708             // Unlock/burn based on token type
```

```
708         if (
709             activeQuestInput.tokenType ==
710             GameRegistryLibrary.TokenType.ERC20
711         ) {
712             if (shouldBurn) {
713                 IGameCurrency(activeQuestInput.tokenContract).burn(
714                     account,
715                     activeQuestInput.amount
716                 );
717             }
718         } else if (
719             activeQuestInput.tokenType ==
720             GameRegistryLibrary.TokenType.ERC721
721         ) {
722             _lockingSystem().removeNFTReservation(
723                 activeQuestInput.tokenContract,
724                 activeQuestInput tokenId,
725                 activeQuestInput.reservationId
726             );
727         } else if (
728             activeQuestInput.tokenType ==
729             GameRegistryLibrary.TokenType.ERC1155
730         ) {
731             _lockingSystem().removeItemReservation(
732                 account,
733                 activeQuestInput.tokenContract,
734                 activeQuestInput tokenId,
735                 activeQuestInput.reservationId
736             );
737
738             if (shouldBurn) {
739                 IGameItems(activeQuestInput.tokenContract).burn(
740                     account,
741                     SafeCast.toInt32(activeQuestInput tokenId),
742                     activeQuestInput.amount
743                 );
744             }
745         }
746     }
747 }
```

Based on this, initially a user would not be able to use the NFT of

another user as input as during the `lockNFT()` call the transaction would revert with the `ORIGIN_NOT_NFT_OWNER` error.

Although, once the original owner has started and completed that quest with that NFT as input, the NFT would remain locked and as this NFT is already locked any user would be able now to start a quest using that NFT as the NFT ownership is not checked to create a reservation nor in the `startQuest()` function.

This would create an exclusive reservation and while this quest is ongoing, the original owner would not be able to make use of that NFT. Moreover, if the issue described in [ERC721 INPUTS ARE NEVER BURNT WHEN THE QUEST INPUTS ARE UNLOCKED](#) was fixed, this NFT could be burnt during this process, leaving the original owner without his NFT. Basically, any user would be able to burn someone else's NFT using it as a quest input.

Proof of Concept:

```

Calling -> contract_QuestSystem.startQuest((1, [(2, contract_PirateNFT.address, 15, 0)]), {'from': user2})
Transaction sent: 0xbc9d1260a5facff8721a643aa01184b9e1d6d20c4a8be690dea5f57e09eb8243
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 21
QuestSystem.startQuest confirmed Block: 15264842 Gas used: 421054 (0.07%)

contract_QuestSystem.activeQuestIdsForAccount(user2) -> (1,
contract_PirateNFT.ownerOf(15) -> 0x0000000000000000000000000000000000000000000000000000000000000000
user2.address -> 0x0000000000000000000000000000000000000000000000000000000000000000
contract_LockingSystem.isNFTLocked(contract_PirateNFT, 15) -> True USER2 STARTS THE QUEST 1 BY USING AS INPUT THE NFT
ID 15 WHICH HE OWNS. THE NFT IS LOCKED AFTER
STARTING THE QUEST

Calling -> chain.sleep(86400)
Calling -> chain.mine(1)

Calling -> contract_QuestSystem.completeQuest(1, {'from': user2})
Transaction sent: 0x1c9f2c5842241d00c0df7f3c645d9f3f8da091df623bc88abd61a9510f497f37
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 22
QuestSystem.completeQuest confirmed Block: 15264844 Gas used: 148959 (0.02%)

Calling -> contract_RandomizerMock.executeAllPendingRequests({'from': owner})
Transaction sent: 0x1fb29dc70b747ff641c18c9f5alaca543c02786d2df4bld5d5befef1648ecf65
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 101
RandomizerMock.executeAllPendingRequests confirmed Block: 15264845 Gas used: 131286 (0.02%)

contract_USDT.balanceOf(user2) -> 200000000000
contract_QuestSystem.activeQuestIdsForAccount(user2) -> ()
contract_PirateNFT.ownerOf(15) -> 0x0000000000000000000000000000000000000000000000000000000000000000
user1.address -> 0x0000000000000000000000000000000000000000000000000000000000000000
user2.address -> 0x0000000000000000000000000000000000000000000000000000000000000000
contract_LockingSystem.isNFTLocked(contract_PirateNFT, 15) -> True USER2 HAS COMPLETED THE QUEST BUT
AS WE CAN SEE THE NFT REMAINS
LOCKED

Calling -> contract_QuestSystem.startQuest((1, [(2, contract_PirateNFT.address, 15, 0)]), {'from': user1})
Transaction sent: 0x9a668350ee0la90febe7ea465f5a26c60ale239e3b6854581bal65labcc0a0c
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 21
QuestSystem.startQuest confirmed Block: 15264846 Gas used: 301589 (0.05%) AS THE NFT ID 15 IS LOCKED, USER1 MANAGES TO START A QUEST
contract_QuestSystem.activeQuestIdsForAccount(user1) -> (2,) USING THIS NFT AS INPUT. A RESERVATION IS CREATED FOR THIS
TOKEN ID

Calling -> contract_QuestSystem.startQuest((1, [(2, contract_PirateNFT.address, 15, 0)]), {'from': user2})
Transaction sent: 0x33ca34e923bd2e2a11746e582941e34c02f68ba4679f06eb6fb00b0334b9843d
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 23
QuestSystem.startQuest confirmed (QUEST_NOT_AVAILABLE: Sender cannot start this quest) Block: 15264847 Gas used: 51646 (0.01%)

Calling -> chain.sleep(86400) USER2 TRIES TO MAKE USE OF HIS NFT BUT HE CANT AS
Calling -> chain.mine(1) THERE IS A RESERVATION IN PLACE CREATED BY USER1

Calling -> contract_QuestSystem.completeQuest(2, {'from': user1}) USER1 SUCCESSFULLY COMPLETES THE QUEST BY USING
Transaction sent: 0x7bdbbf02f39454875129571fe4170cele4010bbd61ddd3a9ebc860d7226d39e3 THE NFT OF USER2 AS INPUT
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 22
QuestSystem.completeQuest confirmed Block: 15264849 Gas used: 148959 (0.02%)

Calling -> contract_RandomizerMock.executeAllPendingRequests({'from': owner}) 
Transaction sent: 0x868b59aa65cf45676ce47c3f888fec8c84aa937ee5a022df47c83ffa512d9
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 102
RandomizerMock.executeAllPendingRequests confirmed Block: 15264850 Gas used: 123786 (0.02%)

contract_USDT.balanceOf(user1) -> 200000000000
contract_QuestSystem.activeQuestIdsForAccount(user1) -> () USER1 SUCCESSFULLY COMPLETES THE QUEST BY USING
contract_PirateNFT.ownerOf(15) -> 0x0000000000000000000000000000000000000000000000000000000000000000 THE NFT OF USER2 AS INPUT
user1.address -> 0x0000000000000000000000000000000000000000000000000000000000000000
user2.address -> 0x0000000000000000000000000000000000000000000000000000000000000000
contract_LockingSystem.isNFTLocked(contract_PirateNFT, 15) -> True

```

Risk Level:

Likelihood - 5

Impact - 5

Recommendation:

It is recommended to:

1. Add a require statement that checks that the caller owns the NFT in the `TokenType.ERC721` if code block, in the `startQuest()` function.

- Also, unlocking the NFT before removing the NFT reservation in the `_unlockQuestInputs()` function.

Remediation Plan:

SOLVED: The Proof of Play team added the GameHelperLibrary. `_verifyInputOwnership(input, account);` call in the `startQuest()` function that validates that the inputs are owned by the caller.

3.2 (HAL-02) FLAWED LOGIC CAUSES THAT NAVIES WILL NEVER STEAL PIRATE'S GOLD - CRITICAL

- Found in Commit ID: v0.0.4

Description:

As per the documentation, in the contract `StakingSystem`, when pirates unstake their items, there should be a 50% chance for all of their gold being stolen by the navies.

This logic is implemented in the functions `_claimGameNFTStakeRewards()` and `fulfillRandomWordsCallback()`.

In the `_claimGameNFTStakeRewards()` function, the variable `balance` is set initially to zero, but then it is never updated with the number of Pirate Ships staked which means that every `VRFRequest.balance` will be zero:

Listing 3: StakingSystem.sol (Lines 677,703)

```

657 function _claimGameNFTStakeRewards(
658     address nftContract,
659     uint256 nftTokenId,
660     bool unstake
661 ) internal {
662     address relevantAccount = tx.origin;
663
664     require(
665         IGameNFT(nftContract).ownerOf(nftTokenId) ==
666         ↳ relevantAccount,
667         "ORIGIN_NOT_OWNER_OF_NFT: Origin is not the owner of the
668         ↳ specified NFT"
669     );
670
671     GameNFTStake storage nftStake = stakedNFTs[nftContract][
672         ↳ nftTokenId];
673     require(
674         nftStake.reservationId != 0,

```

```
672         "NFT_NOT_STAKED: NFT has not been staked"
673     );
674
675     uint256 goldOwed = 0;
676     uint256 xpOwed = 0;
677     uint256 balance = 0;
678
679     for (uint256 i = 0; i < nftStake.gameItemStakes.length; i++) {
680         (
681             uint256 goldFromShip,
682             uint256 xpFromShip
683         ) = _claimGameItemStakeRewards(nftStake.gameItemStakes[i],
684         unstake);
684         goldOwed += goldFromShip;
685         xpOwed += xpFromShip;
686     }
687
688     // Grant XP
689     if (xpOwed > 0) {
690         ITraitsConsumer(nftContract).incrementTrait(
691             nftTokenId,
692             TraitsLibrary.XP_TRAIT_ID,
693             xpOwed
694         );
695     }
696
697     if (unstake) {
698         // Figure out final amount of gold the player earns with
699         // some randomness
700         uint256 requestId = _requestRandomWords(1);
701         vrfRequests[requestId] = VRFRequest({
702             account: relevantAccount,
703             goldOwed: goldOwed,
704             balance: balance,
705             nftContract: nftContract,
706             nftTokenId: nftTokenId
707         });
708
709         // Release hold on NFT
710         _lockingSystem().removeNFTReservation(
711             nftContract,
712             nftTokenId,
713             nftStake.reservationId
714         );
715     }
716 }
```

```

714
715         // Delete the stake
716         delete stakedNFTs[nftContract][nftTokenId];
717
718         // Emit unstaked event
719         emit NFTUnstaked(relevantAccount, nftContract, nftTokenId,
    ↳ requestId);
720     } else {
721         // Mint gold rewards for user
722         if (goldOwed > 0) {
723             goldToken.mint(relevantAccount, goldOwed);
724         }
725
726         emit NFTRewardsClaimed(
727             relevantAccount,
728             nftContract,
729             nftTokenId,
730             unstake,
731             goldOwed
732         );
733     }
734 }
```

This means that when the `fulFillRandomWordsCallback()` function is called by Chainlink VRF:

1. `uint256 coinFlips = randomness % (2**request.balance);`
2. $(2^{**\text{request.balance}}) = (2^{**0}) = 1$, (considering that `request.balance` will always be 0 here)
3. `uint256 coinFlips = randomness % 1`, (any number divided by 1 will always have as remainder 0)
4. `coinFlips` will always be 0
5. if `coinFlips` is 0, `numStolen` will never be increased and will always be 0, hence: Navies will never steal pirate's gold when they are unstaked.

Listing 4: StakingSystem.sol (Lines 814-829)

```

802 function fulfillRandomWordsCallback(
803     uint256 requestId,
804     uint256[] memory randomWords
```

```
805 ) external override onlyRole(GameRegistryLibrary.RANDOMIZER_ROLE)
806 {
807     VRFRequest storage request = vrfRequests[requestId];
808     address account = request.account;
809
810     if (account != address(0)) {
811         uint256 randomness = randomWords[0];
812
813         // This should not overflow since the balance is
814         // determined by gameplay logic
815         // and the user wont have more than 256 ships per stake
816         uint256 coinFlips = randomness % (2**request.balance); // 50% chance of stealing gold per ship staked
817         uint256 numStolen = 0;
818         uint256 goldOwed = request.goldOwed;
819
820         while (coinFlips > 0) {
821             if (coinFlips & 1 == 1) {
822                 numStolen++;
823             }
824
825             if (numStolen > 0) {
826                 uint256 owedToNavy = numStolen * (goldOwed / request.
827                 balance);
828                 _payNavyTax(owedToNavy);
829                 goldOwed = goldOwed - owedToNavy;
830             }
831
832             // Mint gold rewards for user
833             if (goldOwed > 0) {
834                 goldToken.mint(account, goldOwed);
835             }
836
837             // Emit event
838             emit NFTRewardsClaimed(
839                 account,
840                 request.nftContract,
841                 request.nftTokenId,
842                 true,
843                 goldOwed
844             );
845 }
```

```

845         delete vrfRequests[requestId];
846     }
847 }

```

Proof of Concept:

In the image below, 20 Pirate Ships are unstaked which are staked to Pirate ID 60 (command_rank of PirateId 60 = 4):

```

contract_StakingSystem.calculateGameNFTStakeRewards(contract_PirateNFT.address, 60) -> (20000000000000000000000000000000, 1000)
Calling -> contract_StakingSystem._claimGameNFTStakeRewards([contract_PirateNFT.address], [60], True, {'from': user2})
Transaction sent: 0x31aefb38a1f73aa2dc21be0e0d15297eb1c6431805ee80569703dc03b005a
Gas price: 0.0 gwei Gas limit: 60000000 Nonce: 118
StakingSystem._claimGameNFTStakeRewards confirmed Block: 14781586 Gas used: 217665 (0.04%)

contract_GoldToken.balanceOf(user2) -> 12288000000000000000000000000000
requestID -> 82
contract_StakingSystem.vrfRequests(82) -> ('0x0000000000000000000000000000000000000000000000000000000000000002', 20000000000000000000000000000000, 0, '0x6CE98EC5300D3b526CBB8c9af40b7f7F52E6f637', 60)
Calling -> contract_GameRegistry.grantRole('0x265a103c15ecf5b3a7254f7196a0a309dc771f90c6fddeb33a609c14b9c65a', owner.address, {'from': owner})
Transaction sent: 0x8fcfc9297bd1df2831f1c05ceeb337a95ecf94ff9037a4e1cce311bd5b8b3dd003
Gas price: 0.0 gwei Gas limit: 60000000 Nonce: 87
GameRegistry.grantRole confirmed Block: 14781587 Gas used: 40265 (0.01%)

contract_TraitsProvider.getTraitInt256(contract_PirateNFT.address, 60, 3) -> 4
contract_GoldToken.balanceOf(user2) -> 12288000000000000000000000000000
Calling -> contract_StakingSystem._fulfillRandomWordsCallback(requestID, [43243242], {'from': owner})
Transaction sent: 0x0d040b8de1e230561b86ac36e8c0049ae01396cd9eae14645774724959ae9413
Gas price: 0.0 gwei Gas limit: 60000000 Nonce: 88
StakingSystem._fulfillRandomWordsCallback confirmed Block: 14781588 Gas used: 40493 (0.01%)

contract_GoldToken.balanceOf(user2) -> 14288000000000000000000000000000
Total Gold received after unstaking 20 Pirate Ships -> 20000000000000000000

```

Risk Level:

Likelihood - 5

Impact - 5

Recommendation:

It is recommended to fix the logic in the `_claimGameNFTStakeRewards()` function and increase accordingly the `balance` local variable before doing the `_requestRandomWords(1)` call.

Remediation Plan:

SOLVED: The Proof of Play team fixed the issue and now correctly updates the `balance` local variable before making the `_requestRandomWords(1)` call:

Listing 5: StakingSystem.sol (Line 681)

```
671 uint256 balance = 0;
672
673 for (uint256 i = 0; i < nftStake.gameItemStakes.length; i++) {
674     GameItemStake storage gameItemStake = nftStake.gameItemStakes[
675         i];
676     (
677         uint256 goldFromShip,
678         uint256 xpFromShip
679     ) = _claimGameItemStakeRewards(gameItemStake, unstake);
680     goldOwed += goldFromShip;
681     xpOwed += xpFromShip;
682     balance += gameItemStake.balance;
683 }
```

3.3 (HAL-03) UNSAFE CAST CAN ALLOW USERS TO PERMANENTLY MINT GOLD TOKENS - HIGH

- Found in Commit ID: v0.0.4

Description:

In the contract `StakingSystem`, the function `claimNavyStakeRewards()` is used to claim the Gold Tokens rewards for the Navy ships staked. This function calls the `_claimGameItemStakeRewards()` to calculate the `goldOwed`:

Listing 6: StakingSystem.sol (Lines 448-451)

```
426 function claimNavyStakeRewards(
427     address account,
428     uint256[] calldata stakeIndexes,
429     bool unstake
430 ) external whenNotPaused nonReentrant {
431     require(
432         tx.origin == account,
433         "USER_CALLER_ONLY: Only EOA can claim for their own
↳ account"
434     );
435
436     GameItemStake[] storage stakedItems = navyItemStakes[account];
437
438     uint256 goldOwed = 0;
439     uint256 lastStakeIndex = stakedItems.length;
440     for (uint256 idx = 0; idx < stakeIndexes.length; idx++) {
441         uint256 stakeIndex = stakeIndexes[idx];
442         require(
443             stakeIndex < lastStakeIndex,
444             "STAKE_INDEX_MUST_DECREASE: StakeIndexes must be
↳ sorted in descending order and be within bounds"
445         );
446
447         // Claim rewards
```

```

448     (uint256 goldFromShip, ) = _claimGameItemStakeRewards(
449         stakedItems[stakeIndex],
450         unstake
451     );
452     goldOwed += goldFromShip;
453
454     // Emit event
455     emit NavyRewardsClaimed(
456         account,
457         stakedItems[stakeIndex].tokenId,
458         stakedItems[stakeIndex].balance,
459         unstake,
460         goldOwed
461     );
462
463     // If unstaking, remove from array by swapping to end and
464     // popping
465     if (unstake) {
466         if (stakedItems.length > 1) {
467             stakedItems[stakeIndex] = stakedItems[
468                 stakedItems.length - 1
469             ];
470             stakedItems.pop();
471         }
472
473         lastStakeIndex = stakeIndex;
474     }
475
476     // Mint gold rewards for user
477     if (goldOwed > 0) {
478         goldToken.mint(account, goldOwed);
479     }
480 }
```

The `_claimGameItemStakeRewards()` itself calls the `_calculateGameItemStakeRewards()` function and then, in the line 794, the `stake.value` is updated to `totalTaxInGoldPerRank`:

Listing 7: StakingSystem.sol (Lines 750,794)

```

744 function _claimGameItemStakeRewards(
745     GameItemStake storage stake,
```

```
746     bool unstake
747 ) internal returns (uint256 goldOwed, uint256 xpOwed) {
748     address account = _msgSender();
749
750     (goldOwed, xpOwed) = _calculateGameItemStakeRewards(stake);
751     bool pirateShip = GameHelperLibrary._isPirateShip(
752         gameItems,
753         stake tokenId
754     );
755
756     if (pirateShip) {
757         require(
758             !unstake ||
759             ((block.timestamp - stake.value) >=
760              MINIMUM_TO_EXIT),
761             "STAKE_NOT_COMPLETE: Must be staked for minimum time
762              before unstaking"
763         );
764
765         // If pirate is just collecting, there is a flat tax on
766         // their earnings
767         if (!unstake) {
768             uint256 owedToNavy = (goldOwed *
769             GOLD_CLAIM_TAX_PERCENTAGE) /
770             100;
771             _payNavyTax(owedToNavy); // Pay tax to navy
772             goldOwed = goldOwed - owedToNavy; // Rest goes to
773             owner
774         }
775     } else {
776         if (unstake) {
777             uint8 rank = GameHelperLibrary._rankForNavy(
778                 gameItems,
779                 stake tokenId
780             );
781             totalNavyRankStaked -= rank; // Remove rank from total
782             staked
783         }
784     }
785
786     if (unstake) {
787         // Release reservation on items
788         _lockingSystem().removeItemReservation(
789             account,
```

```
784         address(gameItems),
785         stake tokenId,
786         stake reservationId
787     );
788
789     // Emit event
790     emit GameItemUnstaked(account, stake tokenId, stake.
    ↳ balance);
791 } else {
792     // Reset collection timer
793     stake.value = uint80(
794         pirateShip ? block.timestamp : totalTaxInGoldPerRank
795     );
796 }
797 }
```

Solidity 0.8 is introducing type checking for arithmetic operations, but not for type casting. Because of this, an overflow may occur in the Line 794 if `totalTaxInGoldPerRank` is higher than $2^{**80-1} = 1208925819614629174706175$. If that overflow occurs any user with a Navy staked would be able to call `claimNavyStakeRewards()` as many times as he wanted with no time restriction minting with every call the same amount of Gold Tokens.

Proof of Concept:

In the image below, we can see how the user2 keeps increasing his GoldToken balance after every `claimNavyStakeRewards()`:

```

LOOP 96
Calling -> contract_StakingSystem.claimNavyStakeRewards(user2.address, [0], False, {'from': user2})
Transaction sent: 0xf4d2980b518f4b0ea9e38809ddb86ddab0745la5f9fc7a2dfeelf8e5baaf52c
  Gas price: 0.0 gwei  Gas limit: 600000000  Nonce: 219
  StakingSystem.claimNavyStakeRewards confirmed  Block: 14782493  Gas used: 115250 (0.02%)

contract_GoldToken.balanceOf(user2) -> 376458968425544864887734272
Total Gold received after claimNavyStakeRewards() call -> 3626777458843887524118528
contract_StakingSystem.totalTaxInGoldPerRank() -> 431999999999999999999999999997
contract_StakingSystem.calculateNavyStake(user2, 0) -> 3626777458843887524118528

LOOP 97
Calling -> contract_StakingSystem.claimNavyStakeRewards(user2.address, [0], False, {'from': user2})
Transaction sent: 0xe67dd49442d4ed0b227dlc7374e0c559608317df39dad2c0eedba3ce3b733ce5
  Gas price: 0.0 gwei  Gas limit: 600000000  Nonce: 220
  StakingSystem.claimNavyStakeRewards confirmed  Block: 14782494  Gas used: 115250 (0.02%)

contract_GoldToken.balanceOf(user2) -> 380085745884388752411852800
Total Gold received after claimNavyStakeRewards() call -> 3626777458843887524118528
contract_StakingSystem.totalTaxInGoldPerRank() -> 431999999999999999999999999997
contract_StakingSystem.calculateNavyStake(user2, 0) -> 3626777458843887524118528

LOOP 98
Calling -> contract_StakingSystem.claimNavyStakeRewards(user2.address, [0], False, {'from': user2})
Transaction sent: 0xc5dadd9d241f74f92fb64cccb7e38278aecff400814560f29a807e5e47704b7
  Gas price: 0.0 gwei  Gas limit: 600000000  Nonce: 221
  StakingSystem.claimNavyStakeRewards confirmed  Block: 14782495  Gas used: 115250 (0.02%)

contract_GoldToken.balanceOf(user2) -> 383712523343232639935971328
Total Gold received after claimNavyStakeRewards() call -> 3626777458843887524118528
contract_StakingSystem.totalTaxInGoldPerRank() -> 431999999999999999999999999997
contract_StakingSystem.calculateNavyStake(user2, 0) -> 3626777458843887524118528

LOOP 99
Calling -> contract_StakingSystem.claimNavyStakeRewards(user2.address, [0], False, {'from': user2})
Transaction sent: 0x0e56e5c175d8ee93945b0b2b16bc0caeae827badd498265b4dd72653ba9142a2a
  Gas price: 0.0 gwei  Gas limit: 600000000  Nonce: 222
  StakingSystem.claimNavyStakeRewards confirmed  Block: 14782496  Gas used: 115250 (0.02%)

contract_GoldToken.balanceOf(user2) -> 387339300802076527460089856
Total Gold received after claimNavyStakeRewards() call -> 3626777458843887524118528
contract_StakingSystem.totalTaxInGoldPerRank() -> 431999999999999999999999999997
contract_StakingSystem.calculateNavyStake(user2, 0) -> 3626777458843887524118528

```

Risk Level:

Likelihood - 4

Impact - 5

Recommendation:

It is recommended to:

1. Update GameItemStake.value uint80 to at least an uint128.
2. Use [OpenZeppelin's SafeCast library](#).

FINDINGS & TECH DETAILS

Remediation Plan:

SOLVED: The Proof of Play team fixed the issue by updating the GameItemStake.value to uint128. On the other hand, OpenZeppelin's SafeCast library is now used for all the castings.

3.4 (HAL-04) REENTRANCY IN RAFFLEMINTV1.WITHDRAWNONRAFFLEPROCEEDS - HIGH

- Found in Commit ID: v0.0.4

Description:

In the contract `RaffleMintV1`, the function `withdrawNonRaffleProceeds()` is vulnerable to reentrancy as it updates the `nonRaffleDrawableProceeds` after the `payable(_msgSender()).call{value: proceeds}("")`:

Listing 8: RaffleMintV1.sol (Lines 522,526)

```

511 /* @notice Allows contract owner to withdraw proceeds of mints
↳ initiated after raffle */
512 function withdrawNonRaffleProceeds() external onlyOwner {
513     // Ensure there are proceeds to claim
514     require(
515         nonRaffleDrawableProceeds > 0,
516         "NONRAFFLE_PAYOUT_EMPTY: No proceeds available to claim"
517     );
518
519     uint256 proceeds = nonRaffleDrawableProceeds;
520
521     // Pay owner proceeds
522     (bool sent, ) = payable(_msgSender()).call{value: proceeds}("")  

↳ );
523     require(sent == true, "NONRAFFLE_PAYOUT_UNSUCCESSFUL");
524
525     // Proceeds are now claimed so clear amount
526     nonRaffleDrawableProceeds = 0;  

527
528     // Emit successful proceeds claim
529     emit NonRaffleProceedsClaimed(_msgSender(), proceeds);
530 }
```

By exploiting this reentrancy, the contract owner could drain all the Ether of the smart contract and users would not be able to get a refund

of their losing raffle tickets.

Risk Level:

Likelihood - 3

Impact - 5

Recommendation:

It is recommended to set `nonRaffleWithdrawableProceeds` to 0 before the Ether transfer. For example:

Listing 9: RaffleMintV1.sol (Lines 521,524)

```
511 /* @notice Allows contract owner to withdraw proceeds of mints
512   ↳ initiated after raffle */
513 function withdrawNonRaffleProceeds() external onlyOwner {
514     // Ensure there are proceeds to claim
515     require(
516         nonRaffleWithdrawableProceeds > 0,
517         "NONRAFFLE_PAYOUT_EMPTY: No proceeds available to claim"
518     );
519     uint256 proceeds = nonRaffleWithdrawableProceeds;
520
521     nonRaffleWithdrawableProceeds = 0;    ↳
522
523     // Pay owner proceeds
524     (bool sent, ) = payable(_msgSender()).call{value: proceeds}("");
525     require(sent == true, "NONRAFFLE_PAYOUT_UNSUCCESSFUL");
526
527     // Emit successful proceeds claim
528     emit NonRaffleProceedsClaimed(_msgSender(), proceeds);
529 }
```

Remediation Plan:

SOLVED: The Proof of Play team fixed the issue by adding the `nonReentrant` modifier to the `withdrawNonRaffleProceeds()` function.

3.5 (HAL-05) USERS CAN START THE SAME QUEST MULTIPLE TIMES DRAINING THE CHAINLINK VRF SUBSCRIPTION - HIGH

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

In the `QuestSystem` contract every time a quest is completed Chainlink VRF is used:

Listing 10: QuestSystem.sol (Lines 477,482)

```
436 function completeQuest(uint64 activeQuestId)
437     external
438     nonReentrant
439     whenNotPaused
440 {
441     address account = _msgSender();
442     ActiveQuest storage activeQuest = _activeQuests[activeQuestId
↳ ];
443
444     // Make sure active quest exists
445     require(
446         activeQuest.status == ActiveQuestStatus.IN_PROGRESS,
447         "INVALID_ACTIVE_QUEST_ID: ActiveQuest is not IN_PROGRESS"
448     );
449
450     // Check to make sure sender is the quest owner
451     require(
452         activeQuest.account == account,
453         "INVALID_ACCOUNT: Sender did not undertake this quest"
454     );
455
456     // Make sure quest is still active
457     QuestDefinition storage questDef = _questDefinitions[
458         activeQuest.questId
459     ];
```

```

460     require(
461         questDef.active == true,
462         "QUEST_NOT_ACTIVE: Cannot complete inactive quest"
463     );
464
465     uint256 endTime = activeQuest.startTime + questDef.
466     ↳ completionSeconds;
466     require(
467         endTime <= block.timestamp,
468         "NOT_READY_TO_COMPLETE: Quest is not ready to be completed
469     "
470     );
471
472     // TODO: Maybe we fail here automatically if expire time has
472     ↳ passed instead of error?
473     require(
474         questDef.expireSeconds == 0 ||
475             (endTime + questDef.expireSeconds > block.timestamp),
476         "QUEST_HAS_EXPIRED: Quest has expired and is no longer
476     ↳ completeable"
477     );
478
479     // Figure out final amount of gold the player earns with some
479     ↳ randomness
480     uint256 requestId = _requestRandomWords(1);
481     _vrfRequests[requestId] = VRFRequest({
482         account: account,
482     ↳ activeQuestId: activeQuestId
483     });
484
485     // Change status
486     activeQuest.status = ActiveQuestStatus.GENERATING_RESULTS;
487 }
```

Considering that the `accountData.completions[questId]` mapping is only updated after a quest is completed successfully, the `QuestDefinition.MaxCompletions` value can be easily bypassed.

As explained in the `QUESTDEFINITION.MAXCOMPLETIONS CAN BE BYPASSED BY STARTING THE SAME QUEST MULTIPLE TIMES BEFORE COMPLETING THEM` issue, a user can start a quest as many times as he wants as long as he has enough inputs.

For ERC721 and ERC1155 inputs, as these assets are locked once a quest is started, it is not possible to perform the same quest twice. But for ERC20 inputs as there is an open TODO and this is not implemented yet, the ERC20 tokens are not locked when the quest is started, any user can start the same quest as many times as he wants.

Then, after waiting a certain period of time, the same user could complete all the quests that he started. Each completion would make use of Chainlink VRF subscription. It would be possible to totally drain all the LINK balance of the subscription, as there is no limit on how many times the user could start the same quest.

Risk Level:

Likelihood - 3

Impact - 5

Recommendation:

It is recommended to not allow a user to start the same `questId` until the same `questId` has been completed.

Remediation Plan:

RISK ACCEPTED: No mitigation was added to prevent this issue.

3.6 (HAL-06) USERS CAN CRAFT USING AS INPUT AN NFT THEY DO NOT OWN - HIGH

- Found in Commit ID: [c49710da0cfa94e2b3bee730bf980a89a059a700](#)

Description:

In the `CraftingSystem` contract, the `craft()` function is called every time a new craft is started:

Listing 11: CraftingSystem.sol (Lines 425-435)

```
425 } else if (tokenType == GameRegistryLibrary.TokenType.ERC721) {  
426     // Auto-Lock NFT if necessary  
427     ILockingSystem lockingSystem = _lockingSystem();  
428     if (  
429         lockingSystem.isNFTLocked(  
430             input.tokenContract,  
431             input tokenId  
432         ) == false  
433     ) {  
434         lockingSystem.lockNFT(input.tokenContract, input.  
↳ tokenId);  
435     }
```

As we can see, when ERC721 tokens are used as inputs, the function does not check that the token is owned by the caller. Moreover, when an NFT is used as an input for a craft, they are locked and an exclusive reservation is created. Once the craft is completed, the exclusive reservation is removed, but not the lock.

Similar to what was described in [HAL-01](#) issue, initially a user would not be able to use the NFT of another user as input as during the `lockNFT()` call the transaction would revert with the `ORIGIN_NOT_NFT_OWNER` error.

Although, once the original owner has started and completed that craft

with that NFT as input, the NFT would remain locked and as this NFT is already locked any user would be able now to start a craft using that NFT as the NFT ownership is not checked to create a reservation.

Proof of Concept:

```

contract_PirateNFT.ownerOf(15) -> 0x0000000000000000000000000000000000000000000000000000000000102
user2.address -> 0x0000000000000000000000000000000000000000000000000000000000102
contract_LockingSystem.isNFTLocked(contract_PirateNFT, 15) -> False
contract_LockingSystem.getNFTReservationIds(contract_PirateNFT, 15) -> ()

Calling -> contract_CraftingSystem.craft([(l, [(2, contract_PirateNFT.address, 15, 0)]), 1], {'from': user2})
Transaction sent: 0x340c5fbbbl5299dc090f48ec33ffa9blc5e9e3d1512640e2ad7deba692625c8b
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 42
CraftingSystem.craft confirmed Block: 15364536 Gas used: 577790 (0.10%)

contract_PirateNFT.ownerOf(15) -> 0x0000000000000000000000000000000000000000000000000000000000102
user2.address -> 0x0000000000000000000000000000000000000000000000000000000000102
contract_LockingSystem.isNFTLocked(contract_PirateNFT, 15) -> True
contract_LockingSystem.getNFTReservationIds(contract_PirateNFT, 15) -> (l,)

Calling -> contract_RandomizerMock.executeAllPendingRequests({'from': owner})
Transaction sent: 0xee359efca61c81e98272dec1f84d2e4352ef995908e0cc699322223895e99d9
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 206
RandomizerMock.executeAllPendingRequests confirmed Block: 15364537 Gas used: 118106 (0.02%)

contract_USDT.balanceOf(user2) -> 20000000000
contract_CraftingSystem.activeCraftIdsForAccount(user2) -> ()

contract_PirateNFT.ownerOf(15) -> 0x0000000000000000000000000000000000000000000000000000000000102
user1.address -> 0x0000000000000000000000000000000000000000000000000000000000101
user2.address -> 0x0000000000000000000000000000000000000000000000000000000000102
contract_LockingSystem.isNFTLocked(contract_PirateNFT, 15) -> True

Calling -> contract_CraftingSystem.craft([(l, [(2, contract_PirateNFT.address, 15, 0)]), 1], {'from': user1})
Transaction sent: 0x4738695d0e6fc5d8a9a23815a958cf9637620aef7a2fba9c81326b212f3b283
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 42
CraftingSystem.craft confirmed Block: 15364538 Gas used: 458349 (0.08%)

Calling -> contract_RandomizerMock.executeAllPendingRequests({'from': owner})
Transaction sent: 0xb58190cflla6651e9095db0e5103a15ead47fbaba3fee5758bf634fd0baelb58
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 207
RandomizerMock.executeAllPendingRequests confirmed Block: 15364539 Gas used: 110606 (0.02%)

contract_USDT.balanceOf(user1) -> 20000000000
contract_CraftingSystem.activeCraftIdsForAccount(user1) -> ()

```

Risk Level:

Likelihood - 4

Impact - 4

Recommendation:

It is recommended to:

1. Add a require statement that checks that the caller owns the NFT in the `TokenType.ERC721` if code block, in the `craft()` function.

- Also, unlocking the NFT before removing the NFT reservation in the `_unlockRecipeInput()` function.

Remediation Plan:

SOLVED: The Proof of Play team added the `GameHelperLibrary._verifyInputOwnership(input, account);` call in the `craft()` function that validates that the inputs are owned by the caller.

3.7 (HAL-07) CRAFTAMOUNT CAN BE SET TO ZERO DRAINING THE CHAINLINK VRF SUBSCRIPTION - HIGH

- Found in Commit ID: [c49710da0cfa94e2b3bee730bf980a89a059a700](#)

Description:

In the `CraftingSystem` contract, the `craft()` function can be called passing a `0` value as a `craftAmount`. It is not possible to exploit this in any way when ERC1155 tokens are used as inputs, as these errors would stop the exploit: `RESERVE_AMOUNT_MUST_BE_NON_ZERO`, `UNLOCK_AMOUNT_MUST_BE_NON_ZERO`.

When using ERC721 tokens as inputs, as they get an exclusive reservation, this value is not even used, and it is not possible to abuse this.

But when using ERC20 tokens as inputs, it is possible to call this `craft()` function infinite times with no cost as no ERC20 tokens would be burnt because `inputDef.tokenPointer.amount * params.craftAmount` would always be zero.

The attacker will never receive any reward as `_completeRecipe` will always be called with `params.craftAmount = 0` but with every `craft()` call, if the `RecipeDefinition.needsVRF == True`, a Chainlink VRF request will be done. This means that any malicious user could abuse this in order to drain the Chainlink VRF subscription.

Proof of Concept:

```

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0xlecd727ecfe43a7715c5c8e79b52592afal892f8784320032d3c8af03edf60dl
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 105
CraftingSystem.craft confirmed Block: 15366850 Gas used: 364812 (0.06%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0x64bc27bac2b972a6c242ac296273c44328f5f0b6618eb16279bd0d9429ae6c75
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 106
CraftingSystem.craft confirmed Block: 15366851 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0x9d2d75e0d3fce840bab0af2ba5aedf22329cf8c5318c96702d6abbabla0f363
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 107
CraftingSystem.craft confirmed Block: 15366852 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0x63190ef953af75e02c4141c3b08398c81c4b5ef2379db9914b40f775abef118
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 108
CraftingSystem.craft confirmed Block: 15366853 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0x69eff57d95fa1cb5651fecb437faf38ec3d362073ble573ccce40dcddd9f2dc
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 109
CraftingSystem.craft confirmed Block: 15366854 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0x175e4a55bd59b8931fcbebe006e440fa0c576eac7bc32c7e657aaa98bb532ef
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 110
CraftingSystem.craft confirmed Block: 15366855 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0xfb32beeb5aa6282e0de292c3dbc8fb1375d5d6a1b1559d6545e87ffc729f2b
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 111
CraftingSystem.craft confirmed Block: 15366856 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0xd18696f94912d5675b982ed4e7917bea634lc19cacaff76496ff737886f06c78
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 112
CraftingSystem.craft confirmed Block: 15366857 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0x78b04ed71791f95c5a4c21cf3ace47c62f3f5b15fe050e7806839a5eddd7f3c
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 113
CraftingSystem.craft confirmed Block: 15366858 Gas used: 313212 (0.05%)

Calling -> contract_CraftingSystem.craft((l, [(l, contract_USDC.address, 0, 50000_000000)], 0), {'from': user2})
Transaction sent: 0x90fbca5f80db3acca1f9263fcea325104693f7fb893e0e634d204eb44a35905
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 114
CraftingSystem.craft confirmed Block: 15366859 Gas used: 313212 (0.05%)

```

`contract_CraftingSystem.activeCraftIdsForAccount(user2) -> (1, 2, 3, 4, 5, 6, 7, 8, 9, 10)`

Risk Level:

Likelihood - 3

Impact - 5

Recommendation:

It is recommended to add a require statement in the `craft()` function that checks that the `craftAmount` is higher than zero.

Remediation Plan:

SOLVED: The Proof of Play team added a require statement in the `craft()` function that enforces that `craftAmount` is higher than zero.

3.8 (HAL-08) CRAFTS COOLDOWN TIME ARE ALWAYS ZERO - MEDIUM

- Found in Commit ID: [c49710da0cfa94e2b3bee730bf980a89a059a700](#)

Description:

In the `CraftingSystem` contract, when a craft is completed, the `lastCompletionTime` in the `_accountData` mapping is not updated. This means that the `cooldown` value is never considered, so all crafts have no cooldown.

Risk Level:

Likelihood - 5

Impact - 2

Recommendation:

It is recommended to update the `lastCompletionTime` value every time a craft is successfully completed.

Remediation Plan:

PARTIALLY SOLVED: The Proof of Play team now updates the `lastCompletionTime` value every time `_completeRecipe()` is called. Although, this value will be updated even if no crafts are completed successfully. This value should only be updated if at least one craft was completed successfully.

3.9 (HAL-09)

QUESTDEFINITION.MAXCOMPLETIONS CAN BE BYPASSED BY STARTING THE SAME QUEST MULTIPLE TIMES BEFORE COMPLETING THEM - MEDIUM

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

In the `QuestSystem` contract, the `_isQuestAvailable()` function is called every time a new quest is started:

Listing 12: `QuestSystem.sol` (Lines 597-602)

```
573 function _isQuestAvailable(
574     address account,
575     uint32 questId,
576     QuestDefinition memory questDef
577 ) internal view returns (bool) {
578     if (!questDef.active) {
579         return false;
580     }
581
582     // Perform all requirement checks
583     IRequirementSystem requirementSystem = IRequirementSystem(
584         _getSystem(GameRegistryLibrary.REQUIREMENT_SYSTEM)
585     );
586     if (
587         requirementSystem.performAccountCheckBatch(
588             account,
589             questDef.requirements
590         ) == false
591     ) {
592         return false;
593     }
594
595     // Make sure user hasn't completed already
```

```
596     AccountData storage accountData = _accountData[account];  
597     if (  
598         questDef.maxCompletions > 0 &&  
599         accountData.completions[questId] >= questDef.  
↳ maxCompletions  
600     ) {  
601         return false;  
602     }  
603  
604     // Make sure enough time has passed before completions  
605     if (questDef.cooldownSeconds > 0) {  
606         if (  
607             accountData.lastCompletionTime[questId] +  
608                 questDef.cooldownSeconds >  
609                 block.timestamp  
610         ) {  
611             return false;  
612         }  
613     }  
614  
615     return true;  
616 }
```

As we can see, one of the requirements checked is that the quest has not already been completed more than the `QuestDefinition.MaxCompletions` set. Although, the `accountData.completions[questId]` is only updated when a quest is completed successfully.

This means that a user who has enough inputs can bypass this `QuestDefinition.MaxCompletions` limit and complete the quests as many times as the inputs he owns allows him. All he has to do, is starting the same `questId` consecutively, as many times as his inputs allows him, before completing them.

Risk Level:

Likelihood - 5

Impact - 2

Recommendation:

It is recommended to not allow a user to start the same `questId` until the same `questId` has been completed. Basically, a user should not be doing the same quest twice at the same time.

Remediation Plan:

RISK ACCEPTED: The Proof of Play team accepted the risk of this finding.

3.10 (HAL-10) LACK OF PAUSABLE FUNCTIONALITY IN THE LOOTSYSTEM CONTRACT - MEDIUM

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

The `LootSystem` contract is importing the `PausableUpgradeable` library, although it is not making use of the `whenNotPaused` modifier anywhere in the code. Moreover, the contract is initialized in a `paused` state:

Listing 13: LootSystem.sol (Line 77)

```
73 function initialize(address gameRegistryAddress) public
↳ initializer {
74     __Pausable_init();
75     __ReentrancyGuard_init();
76     __GameRegistryConsumer_init(gameRegistryAddress);
77     _pause();
78     _nullLoot = Loot({
79         lootType: LootType.UNDEFINED,
80         amount: 0,
81         tokenContract: address(0),
82         lootId: 0
83     });
84 }
```

All the core public/external functions in the `LootSystem` contract are missing the `whenNotPaused` modifier. With this modifier, functionality could be temporarily paused by the owner of the contract in case of having any issue in the smart contracts.

Risk Level:

Likelihood - 5

Impact - 2

FINDINGS & TECH DETAILS

Recommendation:

It is recommended to add the `whenNotPaused` modifier to all the core public/external functions in the `LootSystem` contract.

Remediation Plan:

RISK ACCEPTED: The Proof of Play team accepted the risk of this finding.

3.11 (HAL-11) MINTBATCH FUNCTION IS NOT IMPLEMENTED - MEDIUM

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

The `LootSystem` contract makes use of the `IGameNFTLoot.mintBatch()` function to assign `LootType.ERC721`:

Listing 14: LootSystem.sol (Lines 372,373)

```
362 function _mintLoot(address to, Loot memory loot) private {
363     if (loot.lootType == LootType.ERC20) {
364         IGameCurrency(loot.tokenContract).mint(to, loot.amount);
365     } else if (loot.lootType == LootType.ERC1155) {
366         IGameItems(loot.tokenContract).mint(
367             to,
368             SafeCast.toUInt32(loot.lootId),
369             loot.amount,
370             true
371         );
372     } else if (loot.lootType == LootType.ERC721) {
373         IGameNFTLoot(loot.tokenContract).mintBatch(to, 1);
374     } else if (loot.lootType == LootType.UNDEFINED) {
375         // Do nothing, NOOP
376         return;
377     } else {
378         require(false, "INVALID_LOOT_TYPE: Invalid loot type for
↳ mintLoot");
379     }
380 }
```

Although this `mintBatch()` function is not implemented anywhere in the code, not even in the `GameNFT` contract:

The screenshot shows a search interface with the following details:

- SEARCH bar at the top containing "function mintBatch(
- Replace button below the search bar.
- Message: "1 result in 1 file - Open in editor"
- Result list:
 - IGameNFTLoot.sol contracts\interfaces
 - function mintBatch(address to, uint8 amount) external;
- Count: 1
- Buttons: Copy (blue outline), Delete (X), and More (three dots).

Risk Level:

Likelihood - 2

Impact - 5

Recommendation:

It is recommended to implement the `mintBatch()` function in the `GameNFT` contract.

Remediation Plan:

RISK ACCEPTED: The Proof of Play team accepted the risk of this finding. Currently, the `mintBatch()` function is not implemented in the `GameNFT` contract.

3.12 (HAL-12) WRONG REQUIRE STATEMENTS IN GAMEGLOBALS CONTRACT - LOW

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

The `GameGlobals` contract allows setting global variables that can be used by any other system/contract. This contract takes an ID and sets a value, that can be a boolean, string, uint, int or arrays of those types.

Although as the following functions contains a wrong require statement, the view function will never return any result as they will revert every time:

Listing 15: GameGlobals.sol (Line 302)

```
294 function getUInt256(uint32 globalId)
295     external
296     view
297     override
298     returns (uint256)
299 {
300     GlobalDataType dataType = _globalMetadata[globalId].dataType;
301     require(
302         dataType != GlobalDataType.UINT &&
303             dataType != GlobalDataType.NOT_INITIALIZED,
304             "GLOBAL_NOT_UINT256: Global is not initialized to a
↳ integer type"
305     );
306
307     return _globalValueUint256[globalId];
308 }
```

`dataType != GlobalDataType.UINT` should be `dataType == GlobalDataType.UINT`

Listing 16: GameGlobals.sol (Line 325)

```
317 function getInt256(uint32 globalId)
318     external
319     view
320     override
321     returns (int256)
322 {
323     GlobalDataType dataType = _globalMetadata[globalId].dataType;
324     require(
325         dataType != GlobalDataType.INT &&
326         dataType != GlobalDataType.NOT_INITIALIZED,
327         "GLOBAL_NOT_UINT256: Global is not initialized to a
328         ↳ integer type"
329     );
330     return _globalValueInt256[globalId];
331 }
```

dataType != GlobalDataType.INT should be dataType == GlobalDataType.INT

Risk Level:

Likelihood - 1

Impact - 3

Recommendation:

It is recommended to correct the require statements as suggested above.

Remediation Plan:

SOLVED: The Proof of Play team corrected the require statements mentioned in the GameGlobals contract.

3.13 (HAL-13) QUESTINPUT.REQUIRED VALUE IS NEVER CHECKED - LOW

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

In the `QuestSystem` contract, the following structure is defined:

Listing 17: QuestSystem.sol (Line 40)

```
34 struct QuestInput {  
35     // Pointer to a token (if ERC20, ERC721, or ERC1155 input type  
↳ )  
36     GameRegistryLibrary.TokenPointer tokenPointer;  
37     // Traits to check against  
38     TraitsLibrary.TraitCheck[] traitChecks;  
39     // Whether or not this input is required  
40     bool required;  
41     // Whether or not the input is burned  
42     bool consumable;  
43     // Chance of losing the consumable item on a failure, 0 -  
↳ 10000 (0 = 0%, 10000 = 100%)  
44     uint32 failureBurnRate;  
45     // Chance of burning the consumable item on success, 0 - 10000  
↳ (0 = 0%, 10000 = 100%)  
46     uint32 successBurnRate;  
47     // Amount of XP gained by this input (ERC721-types only, 0 -  
↳ 10000 (0 = 0%, 10000 = 100%))  
48     uint32 xpEarnedPercent;  
49 }
```

This structure is used to define the items that a user should have to perform a specific quest. One of the fields of that struct is the `required` field, which apparently should be used by the smart contract to determine whether the input is required to start a quest or not.

In the case that the `required` field is `false` the quest should not force the user to have that input to start the quest although the `required`

field is not checked anywhere in the `QuestSystem` smart contract and the contract always enforces the user to have that input.

Risk Level:

Likelihood - 2

Impact - 3

Recommendation:

It is recommended to update the `startQuest()` function, so the inputs are only enforced when the `QuestInput.required` field is `true`. On the other hand, if this field should not be used, it is recommended to remove it from the `QuestInput` struct.

Remediation Plan:

RISK ACCEPTED: The Proof of Play team accepted the risk of this finding.

3.14 (HAL-14) LACK OF DISABLEINITIALIZERS CALL TO PREVENT UNINITIALIZED CONTRACTS - LOW

- Found in Commit ID: [f5c3190140139941351a68da617a91315487e917](#)

Description:

Multiple contracts are using the `Initializable` module from OpenZeppelin. To prevent leaving an implementation contract uninitialized OpenZeppelin's documentation recommends adding the `_disableInitializers` function in the constructor to automatically lock the contracts when they are deployed:

Listing 18: DisableInitializers function

```
1 /**
2  * @dev Locks the contract, preventing any future reinitialization
3  * . This cannot be part of an initializer call.
4  * Calling this in the constructor of a contract will prevent that
5  * contract from being initialized or reinitialized
6  * to any version. It is recommended to use this to lock
7  * implementation contracts that are designed to be called
8  * through proxies.
9 */
10 function _disableInitializers() internal virtual {
11     require(!_initializing, "Initializable: contract is
12     initializing");
13     if (_initialized < type(uint8).max) {
14         _initialized = type(uint8).max;
15         emit Initialized(type(uint8).max);
16     }
17 }
```

Risk Level:

Likelihood - 1

Impact - 3

Recommendation:

Consider calling the `_disableInitializers` function in the contract constructor:

Listing 19: Constructor preventing uninitialized contracts

```
1 /// @custom:oz-upgrades-unsafe-allow constructor
2 constructor() {
3     _disableInitializers();
4 }
```

Remediation Plan:

RISK ACCEPTED: The Proof of Play team accepted the risk of this finding.

3.15 (HAL-15) USERS CAN NOT UNSTAKE NFTS AFTER A CALL TO RESCUEUNLOCKNFT OR RESCUEUNLOCKITEM FUNCTIONS - INFORMATIONAL

- Found in Commit ID: [v0.0.4](#)

Description:

In the `LockingSystem` contract, the `rescueUnlockNFT()` and `rescueUnlockItems()` are used in case of an emergency, so users can bypass all reservations and unlock their NFTs and items:

Listing 20: LockingSystem.sol (Lines 522,552)

```
502 /**
503  * @notice Bypasses all reservations and lets the user forcibly
504  * unlock their NFT
505  * @param tokenContract Token Contract to unlock
506  * @param tokenId        Token Id to unlock
507 */
508 function rescueUnlockNFT(address tokenContract, uint256 tokenId)
509     external
510     nonReentrant
511 {
512     require(
513         rescueUnlockEnabled == true,
514         "RESCUE_NOT_ENABLED: Rescue mode not enabled"
515     );
516     require(
517         IGameNFT(tokenContract).ownerOf(tokenId) == _msgSender(),
518         "SENDER_NOT_NFT_OWNER: sender must be token owner"
519     );
520
521     // Delete lock
522     delete _lockedNFTs[tokenContract][tokenId];
523
524     // Unlock token, if locked
```

```
525     if (IGameNFT(tokenContract).isLocked(tokenId)) {
526         IGameNFT(tokenContract).unlockToken(tokenId);
527     }
528 }
529
530 /**
531 * @notice Bypasses all reservations and lets the user forcibly
532 * unlock their items.
533 *
534 * @param account          Account to unlock items for
535 * @param tokenContract    Token Contract to unlock
536 * @param tokenId           Token Id to unlock
537 */
538 function rescueUnlockItems(
539     address account,
540     address tokenContract,
541     uint256 tokenId
542 ) external nonReentrant {
543     require(
544         rescueUnlockEnabled == true,
545         "RESCUE_NOT_ENABLED: Rescue mode not enabled"
546     );
547     require(
548         account == _msgSender(),
549         "SENDER_NOT_ITEM_OWNER: sender must be token owner"
550     );
551     // Delete any lock data
552     delete _lockedItems[account][tokenContract][tokenId];
553
554     // Unlock token, if locked
555     uint256 balanceLocked = IGameItems(tokenContract).amountLocked
556     (
557         account,
558         tokenId
559     );
560     if (balanceLocked > 0) {
561         IGameItems(tokenContract).unlockToken(
562             account,
563             tokenId,
564             balanceLocked
565         );
566 }
```

In case that one of those NFTs rescued are staked in the StakingSystem contract, any call to `claimGameNFTStakeRewards()` or `claimNavyStakeRewards()` trying to unstake would revert. The `claimGameNFTStakeRewards()` function would call `removeNFTReservation()` causing an underflow in the following line:

Listing 21: LockingSystem.sol (Line 318)

```
300 function removeNFTReservation(
301     address tokenContract,
302     uint256 tokenId,
303     uint32 reservationId
304 ) external override onlyRole(GameRegistryLibrary.
↳ GAME_LOGIC_CONTRACT_ROLE) {
305     NFTLockStatus storage lockStatus = _lockedNFTs[tokenContract][
↳ tokenId];
306     NFTReservation storage reservation = lockStatus.reservations[
307         reservationId
308     ];
309
310     // Make sure reservation exists
311     require(
312         reservation.timestamp > 0,
313         "RESERVATION_NOT_FOUND: No reservation was found with that
↳ id"
314     );
315
316     // Remove from Ids array
317     uint32 index = lockStatus.reservationIndexes[reservationId];
318     if (index != lockStatus.reservationIds.length - 1) {
319         uint32 lastId = lockStatus.reservationIds[
320             lockStatus.reservationIds.length - 1
321         ];
322         lockStatus.reservationIds[index] = lastId;
323         lockStatus.reservationIndexes[lastId] = index;
324     }
325
326     // Remove from all array
327     lockStatus.reservationIds.pop();
328
329     // Update the reserved amount if it was an exclusive
↳ reservation
330     if (reservation.exclusive) {
331         lockStatus.hasExclusiveReservation = false;
```

```
332     }
333
334     // Delete the reservation mapping
335     delete lockStatus.reservations[reservationId];
336
337     // Delete index mapping
338     delete lockStatus.reservationIndexes[reservationId];
339 }
```

In the case of `claimNavyStakeRewards()`, `removeItemReservation()` would be called, and again, an underflow would occur in the following line:

Listing 22: LockingSystem.sol (Line 446)

```
425 function removeItemReservation(
426     address account,
427     address tokenContract,
428     uint256 tokenId,
429     uint32 reservationId
430 ) external override onlyRole(GameRegistryLibrary.
↳ GAME_LOGIC_CONTRACT_ROLE) {
431     ItemLockStatus storage lockStatus = _lockedItems[account][
432         tokenContract
433     ][tokenId];
434     ItemReservation storage reservation = lockStatus.reservations[
435         reservationId
436     ];
437
438     // Make sure reservation exists
439     require(
440         reservation.timestamp > 0,
441         "RESERVATION_NOT_FOUND: No reservation was found with that
↳ id"
442     );
443
444     // Remove from Ids array
445     uint32 index = lockStatus.reservationIndexes[reservationId];
446     if (index != lockStatus.reservationIds.length - 1) {
447         uint32 lastId = lockStatus.reservationIds[
448             lockStatus.reservationIds.length - 1
449         ];
450         lockStatus.reservationIds[index] = lastId;
451         lockStatus.reservationIndexes[lastId] = index;
```

```
452     }
453
454     // Remove from all array
455     lockStatus.reservationIds.pop();
456
457     // Update the reserved amount if it was an exclusive
458     ↳ reservation
459     if (reservation.exclusive) {
460         lockStatus.amountExclusivelyReserved -= reservation.amount
461     ;
460     } else {
461         // Calculate number of items needed for non-exclusive
462         ↳ reservation
463         uint256 max = 0;
464         for (
464             uint256 idx = 0;
465             idx < lockStatus.reservationIds.length;
466             idx++)
467     {
468         ItemReservation storage otherReservation = lockStatus
469             .reservations[lockStatus.reservationIds[idx]];
470         if (
471             otherReservation.exclusive == false &&
472             otherReservation.amount > max
473         ) {
474             max = otherReservation.amount;
475         }
476     }
477
478     lockStatus.maxNonExclusiveReserved = max;
479 }
480
481 // Delete the reservation mapping
482 delete lockStatus.reservations[reservationId];
483
484 // Delete index mapping
485 delete lockStatus.reservationIndexes[reservationId];
486 }
```

Proof of Concept:

```

contract _StakingSystem.getNavyStakes(user1.address) -> ((2, 0, 1, 23),)
contract _LockingSystem.getItemReservationIds(user1.address, contract GameItems.address, 2) -> (23,)
contract _LockingSystem.getItemReservation(user1.address, contract GameItems.address, 2, 23) -> (1, True, 1652086286, 0)
Calling -> contract _LockingSystem.setRescueUnlockEnabled(True, {'from': owner})
Transaction sent: 0x569d348bcf6375fc86d1c1d28eb81f59da416503ac380f43d89ed91fa4e05d9
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 86
LockingSystem.setRescueUnlockEnabled confirmed Block: 14741652 Gas used: 28235 (0.00%)

Calling -> contract _LockingSystem.rescueUnlockItems(user1.address, contract GameItems.address, 2, {'from': user1})
Transaction sent: 0x80d342d06c866687c6d305af37148502a72af3d48f8c23bee23f38deb0b74999
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 54
LockingSystem.rescueUnlockItems confirmed Block: 14741653 Gas used: 34322 (0.01%)

Calling -> contract _StakingSystem.claimNavyStakeRewards(user1.address, [0], True, {'from': user1})
Transaction sent: 0x2e9e81daad1b71594f5e06ee3b14abb40c114505a4aa4234d2537cd28e13b40
Gas price: 0.0 gwei Gas limit: 600000000 Nonce: 55
StakingSystem.claimNavyStakeRewards confirmed (reverted) Block: 14741654 Gas used: 134485 (0.02%)
>>> txl.error()
Trace step -1, Program counter 11935:
File "contracts/StakingSystem.sol", lines 781-786, in StakingSystem._claimGameItemStakeRewards:

if (unstake) {
    // Release reservation on items
    _lockingSystem().removeItemReservation(
        account,
        address(gameItems),
        stake tokenId,
        stake.reservationId
    );
}

// Emit event
emit GameItemUnstaked(account, stake tokenId, stake.balance);

```

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

It is recommended to also consider the `StakingSystem` logic in the `rescueUnlockNFT()` and `rescueUnlockItems()` functions.

An `onlyOwner` `emergencyUnstake()` function could be added. This `emergencyUnstake()` function would only be called to take care of this edge case by the owner of the contract; otherwise users would be able to stake/unstake bypassing the 2 days delay period and draining all the Link tokens of the smart contract.

Remediation Plan:

ACKNOWLEDGED: The Proof of Play team acknowledged this finding. The team claims that if `LockingSystem.setRescueUnlockEnabled(True)` is called, they

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are abandoning the staking contract. It is the “nuclear” option to make sure player assets are always recoverable.

3.16 (HAL-16) DANGEROUS USAGE OF TX.ORIGIN - INFORMATIONAL

- Found in Commit ID: v0.0.4

Description:

tx.origin-based protection can be abused by a malicious contract if a legitimate user interacts with the malicious contract. For example:

Listing 23: Example.sol

```
1 contract TxOrigin {
2     address owner = msg.sender;
3
4     function bug() {
5         require(tx.origin == owner);
6     }
}
```

Bob owns TxOrigin. Bob calls Eve's contract. Eve's contract calls TxOrigin and bypasses the tx.origin protection.

Code Location:

ERC721Lockable.sol

- Line 36: ownerOf(tokenId)== tx.origin,
- Line 71: tx.origin == ownerOf(tokenId),
- Line 91: tx.origin == ownerOf(tokenId),

GameItems.sol

- Line 185: tx.origin == account,
- Line 210: tx.origin == account,

GameNFT.sol

- Line 66: tx.origin == ownerOf(tokenId),
- Line 85: tx.origin == ownerOf(tokenId),

```
StakingSystem.sol
- Line 215: tx.origin == _msgSender() ||
- Line 224: account == tx.origin,
- Line 293: tx.origin == _msgSender() ||
- Line 302: account == tx.origin,
- Line 396: tx.origin == _msgSender(),
- Line 431: tx.origin == account,
- Line 661: address relevantAccount = tx.origin;
```

PirateGameV1.sol

```
- Line 188: tx.origin == _msgSender(),
- Line 272: NFT storage captainNFT = captainNFTs[tx.origin];
- Line 293: IGameNFT(tokenContract).ownerOf(tokenId)== tx.origin,
- Line 352: IGameNFT(nftContract).ownerOf(nftTokenId)== Line
- Line 380: goldToken.burn(tx.origin, goldRequired);
```

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

As the contracts functionality and logic require the use of `tx.origin`, it is recommended to warn the users about the possibility of this attack vector if they interact with unknown smart contracts.

Remediation Plan:

ACKNOWLEDGED: The Proof of Play team acknowledged this finding.

3.17 (HAL-17) STATE VARIABLES MISSING CONSTANT MODIFIER - INFORMATIONAL

- Found in Commit ID: [v0.0.4](#)

Description:

State variables can be declared as `constant` or `immutable`. In both cases, the variables cannot be modified after the contract has been constructed. For `constant` variables, the value has to be fixed at compile-time, while for `immutable`, it can still be assigned at construction time. The following state variables are missing the `constant` modifier:

Randomizer.sol

- Line 35: `uint32 callbackGasLimit = 1000000;`
- Line 38: `uint16 requestConfirmations = 3;`

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

It is recommended to add the `constant` modifier to the state variables mentioned.

Remediation Plan:

SOLVED: The Proof of Play team declared the state variables mentioned as `constant`.

3.18 (HAL-18) STATE VARIABLE MISSING IMMUTABLE MODIFIER - INFORMATIONAL

- Found in Commit ID: [v0.0.4](#)

Description:

Some state variables can be declared as `immutable` to reduce the gas costs.

The `immutable` keyword was added to Solidity in 0.6.5. State variables can be marked `immutable` which causes them to be read-only, but only assignable in the constructor.

Code Location:

PirateGameV1.sol

- Line 53: `uint256 public PIRATE_SHIP_MAX_SUPPLY;`

RaffleMintV1.sol

- Line 35: `IERC721BridgableParent public NFT_CONTRACT;`

Randomizer.sol

- Line 24: `VRFCoordinatorV2Interface COORDINATOR;`
- Line 27: `uint64 subscriptionId;`
- Line 30: `bytes32 internal keyHash;`

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

It is recommended to add the `immutable` modifier to the state variables described.

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Remediation Plan:

SOLVED: The Proof of Play team declared the state variables mentioned as immutable.

3.19 (HAL-19) UNNEEDED INITIALIZATION OF UINT256 VARIABLES TO 0 - INFORMATIONAL

- Found in Commit ID: v0.0.4

Description:

As `i` is an `uint256`, it is already initialized to 0. `uint256 i = 0` reassigned the 0 to `i` which wastes gas.

Code Location:

`TraitsConsumer.sol`

- Line 437: `for (uint32 i = 0; i < traitIds.length; i++){`

`GameItems.sol`

- Line 339: `for (uint8 idx = 0; idx < ids.length; idx++){`

`GameNFT.sol`

- Line 178: `for (uint32 i = 0; i < traitIds.length; i++){`

`StakingSystem.sol`

- Line 235: `for (uint256 i = 0; i < tokenIds.length; i++){`

- Line 325: `for (uint256 i = 0; i < tokenIds.length; i++){`

- Line 410: `for (uint256 idx = 0; idx < nftContracts.length; idx++){`

- Line 439: `for (uint256 idx = 0; idx < stakeIndexes.length; idx++){`

- Line 546: `for (uint256 idx = 0; idx < nftStake.gameItemStakes.length; idx++){`

- Line 678: `for (uint256 i = 0; i < nftStake.gameItemStakes.length; i++){`

`PirateGameV1.sol`

- Line 228: `for (uint32 i = 0; i < tokenIds.length; i++){`

- Line 423: `for (uint8 i = 0; i < shipBondingSupplyPercent.length; i++){`

```
{  
- Line 486: for (uint256 i = 0; i < amount; i++){  
  
RaffleMintV1.sol  
- Line 313: for (uint256 i = 0; i < tickets.length; i++){  
- Line 553: for (uint256 i = 0; i < addresses.length; i++){  
- Line 672: for (uint256 i = 0; i < amount; i++){  
- Line 702: for (uint256 i = 0; i < amount; i++){  
  
ERC1155Lockable.sol  
- Line 185: for (uint8 idx = 0; idx < ids.length; idx++){  
  
LockingSystem.sol  
- Line 198: for (uint256 idx = 0; idx < tokenIds.length; idx++){  
- Line 228: for (uint256 idx = 0; idx < tokenIds.length; idx++){  
- Line 463: for (uint256 idx = 0; idx < lockStatus.reservationIds.  
length; idx++)  
  
TraitsProvider.sol  
- Line 128: for (uint256 idx = 0; idx < traitIds.length; idx++){  
- Line 174: for (uint256 idx = 0; idx < traitIds.length; idx++){
```

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

It is recommended to not initialize uint variables to 0 to save some gas.

For example, use instead:

```
for (uint32 i; i < traitIds.length; ++i){.
```

Remediation Plan:

SOLVED: The `Proof of Play` team followed Halborn's suggestion and does not initialize uint variables to 0 reducing the gas costs.

3.20 (HAL-20) USING `++I` CONSUMES LESS GAS THAN `I++` IN LOOPS - INFORMATIONAL

- Found in Commit ID: [v0.0.4](#)

Description:

In the loops below, the variable `i` is incremented using `i++`. It is known that, in loops, using `++i` costs less gas per iteration than `i++`.

Code Location:

`TraitsConsumer.sol`

- Line 437: `for (uint32 i = 0; i < traitIds.length; i++){`

`GameItems.sol`

- Line 339: `for (uint8 idx = 0; idx < ids.length; idx++){`

`GameNFT.sol`

- Line 178: `for (uint32 i = 0; i < traitIds.length; i++){`

`StakingSystem.sol`

- Line 235: `for (uint256 i = 0; i < tokenIds.length; i++){`
- Line 325: `for (uint256 i = 0; i < tokenIds.length; i++){`
- Line 410: `for (uint256 idx = 0; idx < nftContracts.length; idx++){`
- Line 439: `for (uint256 idx = 0; idx < stakeIndexes.length; idx++){`
- Line 546: `for (uint256 idx = 0; idx < nftStake.gameItemStakes.length; idx++){`
- Line 678: `for (uint256 i = 0; i < nftStake.gameItemStakes.length; i++){`

`ERC721BridgableChild.sol`

- Line 51: `for (uint256 i; i < length; i++){`
- Line 150: `for (uint256 i; i < length; i++){`

```

PirateGameV1.sol
- Line 228: for (uint32 i = 0; i < tokenIds.length; i++){
- Line 423: for (uint8 i = 0; i < shipBondingSupplyPercent.length; i++)
{
- Line 486: for (uint256 i = 0; i < amount; i++){

RaffleMintV1.sol
- Line 313: for (uint256 i = 0; i < tickets.length; i++){
- Line 553: for (uint256 i = 0; i < addresses.length; i++){
- Line 672: for (uint256 i = 0; i < amount; i++){
- Line 702: for (uint256 i = 0; i < amount; i){

ERC1155Lockable.sol
- Line 185: for (uint8 idx = 0; idx < ids.length; idx++){

LockingSystem.sol
- Line 198: for (uint256 idx = 0; idx < tokenIds.length; idx++){
- Line 228: for (uint256 idx = 0; idx < tokenIds.length; idx++){
- Line 463: for (uint256 idx = 0; idx < lockStatus.reservationIds.
length; idx++)

TraitsProvider.sol
- Line 128: for (uint256 idx = 0; idx < traitIds.length; idx++){
- Line 174: for (uint256 idx = 0; idx < traitIds.length; idx++){

```

Proof of Concept:

For example, based in the following test contract:

Listing 24: Test.sol

```

1 // SPDX-License-Identifier: MIT
2 pragma solidity 0.8.9;
3
4 contract test {
5     function postincrement(uint256 iterations) public {
6         for (uint256 i = 0; i < iterations; i++) {
7             }
8     }
9     function preincrement(uint256 iterations) public {

```

```

10         for (uint256 i = 0; i < iterations; ++i) {
11     }
12 }
13 }
```

We can see the difference in the gas costs:

```

>>> test_contract.postincrement(1)
Transaction sent: 0xlecede6b109b707786d3685bd71dd9f22dc389957653036ca04c4cd2e72c5e0b
Gas price: 0.0 gwei Gas limit: 6721975 Nonce: 44
test.postincrement confirmed Block: 13622335 Gas used: 21620 (0.32%)

<Transaction '0xlecede6b109b707786d3685bd71dd9f22dc389957653036ca04c4cd2e72c5e0b'>
>>> test_contract.preincrement(1)
Transaction sent: 0x205f09a4d2268de4cla40f35bb2ec2847bf2ab8d584909b42c71a022b047614a
Gas price: 0.0 gwei Gas limit: 6721975 Nonce: 45
test.preincrement confirmed Block: 13622336 Gas used: 21593 (0.32%)

<Transaction '0x205f09a4d2268de4cla40f35bb2ec2847bf2ab8d584909b42c71a022b047614a'>
>>> test_contract.postincrement(10)
Transaction sent: 0x98c04430526a59balcf947c114b62666a4417165947d31bf300cd6ae68328033
Gas price: 0.0 gwei Gas limit: 6721975 Nonce: 46
test.postincrement confirmed Block: 13622337 Gas used: 22673 (0.34%)

<Transaction '0x98c04430526a59balcf947c114b62666a4417165947d31bf300cd6ae68328033'>
>>> test_contract.preincrement(10)
Transaction sent: 0xf060d04714eff8482a828342414d5a20be9958c822d42860e7992aba20elde05
Gas price: 0.0 gwei Gas limit: 6721975 Nonce: 47
test.preincrement confirmed Block: 13622338 Gas used: 22601 (0.34%)

<Transaction '0xf060d04714eff8482a828342414d5a20be9958c822d42860e7992aba20elde05'>
```

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

It is recommended to use `++i` instead of `i++` to increment the value of an `uint` variable inside a loop. This does not only apply to the iterator variable. It also applies to increments done inside the loop code block.

Remediation Plan:

SOLVED: The [Proof of Play team](#) followed Halborn's suggestion and uses now `++i` instead of `i++` to increment the value of `uint` variables inside loops.

3.21 (HAL-21) UNNEEDED ARRAYS DECLARATION IN FINISHMINTSHIPS FUNCTION - INFORMATIONAL

- Found in Commit ID: [v0.0.4](#)

Description:

In the `PirateGameV1` contract, the function `_finishMintShips()` contains the following code:

```
Listing 25: PirateGameV1.sol (Lines 501,502,506,507,512,513)

476 function _finishMintShips(
477     address to,
478     uint32 amount,
479     bool lock,
480     uint256 randomness
481 ) private {
482     uint256 numPirateShips = 0;
483     uint256 numNavyShips = 0;
484
485     uint256 seed = 0;
486     for (uint256 i = 0; i < amount; i++) {
487         // Pick pirate or navy
488         seed = uint256(keccak256(abi.encode(randomness, i)));
489
490         // 20% chance of navy
491         if ((seed & 0xFFFF) % 5 == 0) {
492             numNavyShips++;
493         } else {
494             numPirateShips++;
495         }
496     }
497
498     // Subtract pending mints
499     mintsPending -= amount;
500
501     uint256[] memory typeIds = new uint256[](2);
502     uint256[] memory balances = new uint256[](2);
```

```
503
504     if (numPirateShips > 0) {
505         gameItems.mint(to, pirateShipTypeId, numPirateShips, lock)
506         ↴ ;
507         typeIds[0] = pirateShipTypeId;
508         balances[0] = numPirateShips;
509     }
510
511     if (numNavyShips > 0) {
512         gameItems.mint(to, navyShipTypeId, numNavyShips, lock);
513         typeIds[1] = navyShipTypeId;
514         balances[1] = numNavyShips;
515 }
```

As we can see above, the arrays `typeIds` and `balances` are created in memory but they are not used anywhere in the code; hence they can be removed to reduce the gas costs.

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

It is recommended to remove the arrays `typeIds` and `balances` from the `_finishMintShips()` function to reduce the gas costs.

Remediation Plan:

SOLVED: The Proof of Play team solved this issue.

3.22 (HAL-22) MISSING VIEW FUNCTION THAT DISPLAYS ALL THE TICKETS OWNED BY A USER - INFORMATIONAL

- Found in Commit ID: [v0.0.4](#)

Description:

In the `RaffleMintV1` contract, there is no view function that displays what tickets are currently owned by a user.

The tickets would be mixed after `clearRaffle()` is called, which makes it very difficult for users to know which tickets they own. To get that information, they would have to manually query every single position of the `raffleEntries` array.

A view function, that displays the tickets owned by the user, would be especially useful to properly do the `claimRaffle()` call.

Risk Level:

Likelihood - 1

Impact - 1

Recommendation:

It is recommended to add a view function in the `RaffleMintV1` smart contract that displays what tickets are currently owned by a user.

Remediation Plan:

SOLVED: The `Proof of Play team` corrected this issue. The function `getEntriesForAddress()` can be used to display what tickets are currently owned by the caller.

3.23 (HAL-23) INCORRECT COMMENT - INFORMATIONAL

- Found in Commit ID: [v0.0.4](#)

Description:

In the `StakingSystem` contract, in the `fulfillRandomWordsCallback()` function above the `coinFlips` state variable declaration, there is a comment that states:

“This should not overflow since the balance is determined by gameplay logic and the user will not have more than 256 ships per stake.”

This comment is incorrect, as a `2^256` would definitely overflow. In this case, the maximum amount of ships per stake is 50 which corresponds to a Pirate with the maximum Command Rank:

Listing 26: StakingSystem.sol (Line 47)

```
35 // Number of ships a pirate can command for each command rank
36 uint8[] public SHIPS_PER_COMMAND_RANK = [
37     0,
38     5,
39     10,
40     15,
41     20,
42     25,
43     30,
44     35,
45     40,
46     45,
47     50
48];
```

Risk Level:

Likelihood - 1

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Impact - 1

Recommendation:

It is recommended to correct the suggested comment.

Remediation Plan:

ACKNOWLEDGED: The Proof of Play team acknowledged this finding.

AUTOMATED TESTING

4.1 STATIC ANALYSIS REPORT

Description:

Halborn used automated testing techniques to enhance the coverage of certain areas of the smart contracts in scope. Among the tools used was Slither, a Solidity static analysis framework. After Halborn verified the smart contracts in the repository and was able to compile them correctly into their abis and binary format, Slither was run against the contracts. This tool can statically verify mathematical relationships between Solidity variables to detect invalid or inconsistent usage of the contracts' APIs across the entire code-base.

Slither results:

ERC721BridgableChild.sol

```

ERC721Lockable.rescueUnlock(uint256) (contracts/ERC721Lockable.sol#80-43) uses tx.origin for authorization: require(bool,string)(ownerOf(tokenId) == tx.origin,ORIGIN_NOT_NFT_OWNER: tx.origin must be the owner of the NFT) (contracts/ERC721Lockable.sol#80-43)
ERC721Lockable._lockToken(uint256) (contracts/ERC721Lockable.sol#69-92) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_LOCK: Only owner can lock token) (contracts/ERC721Lockable.sol#70-79)
ERC721Lockable._unlockToken(uint256) (contracts/ERC721Lockable.sol#69-102) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_UNLOCK: Only owner can unlock token) (contracts/ERC721Lockable.sol#70-112)
ERC721Lockable._transferWithMetadata(address,uint256) (contracts/ERC721BridgableChild.sol#113-129) has external calls inside a loop: TransferWithMetadata(_msgSender(),address(),tokenId,_data).encodeTokenMetadata(tokenId) (contracts/ERC721BridgableChild.sol#113-129)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#dangerous-usage-of-toxicoin

ERC721BridgableChild.withdrawBatch(uint256[]).i (contracts/ERC721BridgableChild.sol#51) is a local variable never initialized
ERC721BridgableChild._deposit(address,uint256).i (contracts/ERC721BridgableChild.sol#150) is a local variable never initialized
References: https://github.com/crytic/slither/wiki/Detector-Documentation#uninitialized-local-variables

ERC721._checkNonERC721Received(addresses,address,int256,b bytes) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-409) ignores return value by IERC721Receiver(to).onERC721Received(_msgSender(),from,tokenId,_data) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-409)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-return

ERC721._checkNonERC721Received(address,address,uint256,b bytes) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-405)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-return

ERC721BridgableChild._withdrawMetadata(uint256) (contracts/ERC721BridgableChild.sol#113-129) has external calls inside a loop: TransferWithMetadata(_msgSender(),address(),tokenId,this.encodeTokenMetadata(tokenId)) (contracts/ERC721BridgableChild.sol#113-129)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#loops-inside-a-loop

Variable '_ERC721__checkNonERC721Received(address,address,int256,b bytes)', external (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#109) is used before declaration: _checkNonERC721Received(addresses,address,int256,b bytes) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-409)
Variable '_ERC721__checkNonERC721Received(address,address,int256,b bytes)', redeclaration: _checkNonERC721Received(addresses,address,int256,b bytes) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#397) in ERC721._checkNonERC721Received(addresses,address,int256,b bytes) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-409) potentially used before declaration: reason.length == 0 (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#156)
Variables declared: _msgSender() (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#401) in ERC721._checkNonERC721Received(addresses,address,int256,b bytes) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-409)
Variables used: _msgSender() (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-409) potentially used before declaration: revert(uint256,int256[3]) (3 + reason.length(int256[3])) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#402)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#pre-declaration-usage-of-local-variables

ERC721BridgableChild.deposit(addresses,bytes) (contracts/ERC721BridgableChild.sol#139-155):
External calls:
- _safeTransferFrom((token), (to), (child), (value), (data), (operator)) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#141)
- _ERC721__checkNonERC721Received(_msgSender(),from,tokenId,_data) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#395-405)
Event emitted after the call(s):
- DepositFromBridge(tokenId,address,bytes) (contract/ERC721BridgableChild.sol#143)
Reentrancy guard:
- _safeTransferFrom((token), (to), (child), (value), (data), (operator)) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#143)
External calls:
- _safeTransferFrom((token), (to), (child), (value), (data), (operator)) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#143)
- _ERC721__checkNonERC721Received(_msgSender(),from,tokenId,_data) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#395-405)
Event emitted after the call(s):
- DepositFromBridge(tokenId,address,bytes) (contract/ERC721BridgableChild.sol#143)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities
ERC721._checkNonERC721Received(addresses,address,int256,b bytes) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#398-409) uses assembly
Address.verifyCallResult(bool,bytes,string) (node_modules/openzeppelin/contracts/utils/Address.sol#201-221) uses assembly
- INLINE ASM (node_modules/openzeppelin/contracts/token/Address.sol#213-214)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage

ERC721Lockable.rescueUnlock(uint256) (contracts/ERC721Lockable.sol#80-43) compares to a boolean constant:
- require(bool,string)(tx.origin == ownerOf(tokenId),NOT_UNLOCKED_NFT: NFT is not unlocked) (contracts/ERC721Lockable.sol#31-34)
ERC721Lockable._lockToken(uint256) (contracts/ERC721Lockable.sol#69-92) compares to a boolean constant:
- require(bool,string)(_locked[tokenId] == false,NFT_NOT_UNLOCKED_NFT is not unlocked) (contracts/ERC721Lockable.sol#74-77)
ERC721Lockable._unlockToken(uint256) (contracts/ERC721Lockable.sol#69-102) compares to a boolean constant:
- require(bool,string)(!_locked[tokenId] == true,NFT_NOT_LOCKED_NFT is not locked) (contracts/ERC721Lockable.sol#96-97)
ERC721Lockable._transferWithMetadata(address,uint256) (contracts/ERC721Lockable.sol#108-129) compares to a boolean constant:
- require(bool,string)(!_locked[tokenId] == false,TOKEN_IS_LOCKED: Token is locked in-game and cannot be transferred until it is unlocked) (contracts/ERC721Lockable.sol#116-119)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#bool-equality

Different versions of Solidity:
- 0.8.0+ (version used: "0.8.0")
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#139)
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#141)
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#143)
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Metadata.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Metadata.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/Context.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/Context.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/introspection/IERC165.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/introspection/IERC165.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/token/introspection/IERC165.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/interfaces/IERC721.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/interfaces/IERC721.sol#4)
- 0.8.0 (node_modules/openzeppelin/contracts/interfaces/IERC721.sol#4)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#different-program-direcives-are-used

ERC721Enumerable._removeTokenFromAllTokenEnumeration(uint256) (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#144-162) has costly operations inside a loop:
- delete_allTokensFromIndex((index)) (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#145)
- allTokens.pop() (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#146)
- allTokens.pop() (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#147)
ERC721Enumerable._removeTokenFromTokenEnumeration(address,uint256) (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#144-162) has costly operations inside a loop:
- delete_allTokensFromIndex((index)) (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#145)
- allTokens.pop() (node_modules/openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#146)
ERC721._burn(uint256) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#304-319) has costly operations inside a loop:
- delete_token((tokenId)) (node_modules/openzeppelin/contracts/token/ERC721/ERC721.sol#313)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#costly-operations-inside-a-loop

Address.functionCall(address,bytes) (node_modules/openzeppelin/contracts/token/Address.sol#87) is never used and should be removed
Address.functionCallWithValue(address,bytes,uint256) (node_modules/openzeppelin/contracts/token/Address.sol#116-120) is never used and should be removed
Address.functionCallWithValue(address,bytes,int256) (node_modules/openzeppelin/contracts/token/Address.sol#126-130) is never used and should be removed
Address.functionDelegateCall(address,bytes,string) (node_modules/openzeppelin/contracts/token/Address.sol#134-139) is never used and should be removed
Address.functionStaticCall(address,bytes) (node_modules/openzeppelin/contracts/token/Address.sol#147-149) is never used and should be removed
Address.functionStaticCallWithValue(address,bytes,uint256) (node_modules/openzeppelin/contracts/token/Address.sol#150-153) is never used and should be removed
Address.functionStaticCallWithValue(address,bytes,int256) (node_modules/openzeppelin/contracts/token/Address.sol#154-157) is never used and should be removed
Address.functionSendValue(address,uint256) (node_modules/openzeppelin/contracts/token/Address.sol#160-163) is never used and should be removed
Address.verifyCallResult(bool,bytes,string) (node_modules/openzeppelin/contracts/token/Address.sol#201-221) is never used and should be removed
Context._msgData() (node_modules/openzeppelin/contracts/token/Address.sol#23) is never used and should be removed

```


ERC1155Lockable.sol

```

ERC1155Lockable.role(address) should be declared external;
- AccessControl.grantRole(address) (node_modules/@openzeppelin/contracts/access/AccessControl.sol#142-144)
revokeRole(bytes32,address) (node_modules/@openzeppelin/contracts/access/AccessControl.sol#155-157)
renounceRole(bytes32,address) (node_modules/@openzeppelin/contracts/access/AccessControl.sol#173-177)
name() should be declared external;
- ERC721.name() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#179-181)
symbol() should be declared external;
- ERC721.symbol() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#186-188)
approve(address,uint256) should be declared external;
- ERC721.approve(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#112-112)
setApprovalForAll(address,bool) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#136-138)
transferFrom(address,address,uint256) should be declared external;
- ERC721.safeTransferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#150-159)
safeTransferFrom(address,address,uint256) should be declared external;
- ERC721.safeTransferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#166-170)
tokenOfOwnerByIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#97-100)
tokenByIndex(uint256) should be declared external;
- ERC721.tokenByIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721Enumerable.sol#52-55)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

ERC721Lockable.sol
ERC721Lockable.reserveUnlock(uint256) (contracts/ERC721Lockable.sol#30-43) ignores return value by IERC721Receiver(to).onERC721Received(_msgSender(),from,toTokenId,_data) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#89-93)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-return

Variable ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#395) in ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) potentially used before declaration: return !ERC721._checkOnERC721Received.selector (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#396)
Variable ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#397) in ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#396)
Variable ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#398) in ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#396)
Variable ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#399) in ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#396)
Variable ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#400) potentially used before declaration: revert(uint256)(S2 + reason,blownOutInvert256)(reason) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#402)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#deceleration-of-local-variables

ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) uses assembly
Address.verifyCallResult(bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#201-221) uses assembly
- INLINE ASM (node_modules/@openzeppelin/contracts/utils/Address.sol#219-216)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-use

ERC721Lockable.reserveUnlock(uint256) (contracts/ERC721Lockable.sol#30-43) compares to a boolean constant:
    require(bool,string) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#31-34)
ERC721Lockable.lockToken(uint256) (contracts/ERC721Lockable.sol#69-93) compares to a boolean constant:
    -require(bool,string) == false, _NOT_UNLOCKED (if token is not unlocked) (contracts/ERC721Lockable.sol#174-177)
ERC721Lockable.unlockToken(uint256) (contracts/ERC721Lockable.sol#69-93) compares to a boolean constant:
    -require(bool,string) == true, _NOT_LOCKED (if token is not locked) (contracts/ERC721Lockable.sol#96-97)
ERC721Lockable.beforeTokenTransfer(address,address,uint256) (contracts/ERC721Lockable.sol#108-123) compares to a boolean constant:
    -require(bool,string) == false, _TOKEN_IS_LOCKED (Token is locked in-game and cannot be transferred until it is unlocked) (contracts/ERC721Lockable.sol#116-119)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#bool-equality

Different versions of Solidity is used:
- Version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#18)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#187)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#188)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#189)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#190)
- 0.8.1 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#191)
- 0.8.1 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#192)
- 0.8.1 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#193)
- 0.8.1 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#194)
- 0.8.1 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#195)
- 0.8.1 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#196)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#197)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#198)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#199)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#200)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#different-pragma-directives-are-used

Address.functionCall(address,bytes,(node_modules/@openzeppelin/contracts/utils/Address.sol#87)) is never used and should be removed
Address.functionCall(address,bytes,(node_modules/@openzeppelin/contracts/utils/Address.sol#95-101)) is never used and should be removed
Address.functionCallWithValue(address,bytes,uint256,(node_modules/@openzeppelin/contracts/utils/Address.sol#111-120)) is never used and should be removed
Address.functionCallWithValue(address,bytes,uint256,(node_modules/@openzeppelin/contracts/utils/Address.sol#135-139)) is never used and should be removed
Address.functionDelegateCall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#148-158) is never used and should be removed
Address.functionStaticCall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#159-169) is never used and should be removed
Address.functionSendValue(address,uint256) (node_modules/@openzeppelin/contracts/utils/Address.sol#167-168) is never used and should be removed
Address.functionStaticCall(addresses,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#187-196) is never used and should be removed
Address.functionStringify(uint256) (node_modules/@openzeppelin/contracts/utils/Strings.sol#4-5) is never used and should be removed
String.toHexString(uint256) (node_modules/@openzeppelin/contracts/utils/Strings.sol#6-66) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code

Pragma version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#194) allows old versions
Pragma version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#200-205) allows old versions
Pragma version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#218-219) allows old versions
Pragma version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#223-224) allows old versions
Pragma version 0.9.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#225-226) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#14) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#15) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#16) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#17) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#18) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#19) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#20) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#21) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#22) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#23) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#24) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#25) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#26) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#27) allows old versions
Pragma version 0.9.1 (node_modules/@openzeppelin/contracts/token/Address.sol#28) allows old versions
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in Address.setValue(address,uint256) (node_modules/@openzeppelin/contracts/utils/Address.sol#65):
    - (success,recipient) == target.call.value(uint256)(data) (node_modules/@openzeppelin/contracts/utils/Address.sol#129-139);
Low level call in Address.functionStaticCall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#137):
    - (success,returnData) == target.functionStaticCall(address,bytes,string)(data) (node_modules/@openzeppelin/contracts/utils/Address.sol#157-160);
Low level call in Address.functionDelegateCall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#184-189):
    - (success,returnData) == target.functionDelegateCall(address,bytes,string)(data) (node_modules/@openzeppelin/contracts/utils/Address.sol#191)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Parameter ERC721.safeTransferFrom(address,address,uint256,bytes) (data) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#179) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

name() should be declared external;
- ERC721.name() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#187-181)
symbol() should be declared external;
- ERC721.symbol() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#186-188)
tokenOfOwnerByIndex(uint256) should be declared external;
- ERC721.tokenOfOwnerByIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#97-98)
approve(address,uint256) should be declared external;
- ERC721.approve(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#112-112)
setApprovalForAll(address,bool) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#136-138)
transferFrom(address,address,uint256) should be declared external;
- ERC721.safeTransferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#150-159)
safeTransferFrom(address,address,uint256) should be declared external;
- ERC721.safeTransferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#166-170)
tokenOfOwnerByIndex(uint256) should be declared external;
- ERC721.tokenOfOwnerByIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#97-100)
tokenByIndex(uint256) should be declared external;
- ERC721.tokenByIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721Enumerable.sol#52-55)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

GameItems.sol

```

Utillibrary_based(bytes) (contract/libraries/Utillibrary.sol#1-82) contains an incorrect shift operation: mstore(uint256,uint256)(resultPcr_base4_ssm_0 - 2,0x3d3d << 240) (contracts/libraries/Utillibrary.sol#74)
Utillibrary_based(bytes) (contract/libraries/Utillibrary.sol#1-82) contains an incorrect shift operation: mstore(uint256,uint256)(resultPcr_base4_ssm_0 - 1,0x3d << 268) (contracts/libraries/Utillibrary.sol#77)

Frama version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#14) allows old versions
Frama version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155Receiver.sol#14) allows old versions
Frama version 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC1155/extensions/IERC1155MetadataURI.sol#14) allows old versions

Frama version 0.8.1 (node_modules/@openzeppelin/contracts/token/Address.sol#137) ignores return value by IERC1155Receiver(to).onERC1155Received(operator,from,i,amount,data)
Frama version 0.8.0 (node_modules/@openzeppelin/contracts/token/Address.sol#137) ignores return value by IERC1155BatchReceived(operator,to,i,amounts,data)
Frama version 0.8.0 (node_modules/@openzeppelin/contracts/token/Address.sol#137) ignores return value by IERC1155BatchReceived(operator,to,i,amounts,data)
Frama version 0.8.0 (node_modules/@openzeppelin/contracts/token/Address.sol#137) ignores return value by IERC1155BatchReceived(operator,to,i,amounts,data)

GameItems.lockToken(address,uint256,uint256) (contracts/GameItems.sol#179-194) uses tx.origin for authorization: require(bool,string)(tx.origin == account,ONLY_OWNER_CAN_LOCK: Only origin owner can lock token) (contracts/GameItems.sol#18)
GameItems.unlockToken(address,uint256,uint256) (contracts/GameItems.sol#204-219) uses tx.origin for authorization: require(bool,string)(tx.origin == account,ONLY_OWNER_CAN_UNLOCK: Only origin owner can unlock token) (contracts/GameItems.sol#19)
GameItems.setPaused(bool) (contracts/GameItems.sol#12) should be declared external: setPaused()
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dangerous-use-of-txorigin

ERC1155._doSafeTransferAcceptanceCheck(address,address,uint256,uint256,bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#47) is a local variable never initialized
ERC1155._doSafeBatchTransferAcceptanceCheck(address,address,uint256[],uint256[],bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#481-490) ignores return value by IERC1155Receiver(to).onERC1155Received(operator,from,i,amount,data)
ERC1155._doSafeTransferAcceptanceCheck(address,address,uint256,uint256,bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#470) is a local variable never initialized
ERC1155._doSafeBatchTransferAcceptanceCheck(address,address,uint256[],uint256[],bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#482-503) ignores return value by IERC1155Receiver(to).onERC1155BatchReceived(operator,to,i,amounts,data)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#uninitialized-local-variables

ERC1155._doSafeTransferAcceptanceCheck(address,address,uint256,uint256,bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#470) in ERC1155._doSafeTransferAcceptanceCheck(address,address,addr,uint256,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#461-490) potentially used before declaration: response != IERC1155Receiver.onERC1155Received.selector (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#471)
Variable ERC1155._doSafeTransferAcceptanceCheck(address,address,uint256,uint256,bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#471) in ERC1155._doSafeTransferAcceptanceCheck(address,address,addr,uint256,uint256,bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#471) is a local variable never initialized
Variable ERC1155._doSafeBatchTransferAcceptanceCheck(address,address,uint256[],uint256[],bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#481-490) in ERC1155._doSafeBatchTransferAcceptanceCheck(address,address,addr,uint256[],uint256[],bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#481-490) is a local variable never initialized
Variable ERC1155._doSafeTransferAcceptanceCheck(address,address,uint256,uint256,bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#470) in ERC1155._doSafeTransferAcceptanceCheck(address,address,addr,uint256,uint256,bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#470) is a local variable never initialized
Variable ERC1155._doSafeBatchTransferAcceptanceCheck(address,address,uint256[],uint256[],bytes), reason (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#482-503) potentially used before declaration: response != IERC1155Receiver.onERC1155BatchReceived.selector (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#483)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#pre-declaration-usage-of-local-variables

Reentrancy in GameItems.mint(address,uint256,uint256,bool) (contracts/GameItems.sol#148):
    External calls:
        - mint((to,id,amount), (contracts/GameItem.sol#143))
        - IERC1155BatchReceiver((operator,to),onERC1155Received(operator,from,id,amount,data)) (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#470-478)
    State variables written after the calls:
        - _lockTokens((to,id,amount), (contracts/GameItem.sol#146))
        - _lockedTokens((account,id), (contracts/ERC1155Lockable.sol#139))
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-2
    Reentrancy in GameItems.mint(address,uint256,uint256,bool) (contracts/GameItems.sol#148):
        External calls:
            - mint((to,id,amount), (contracts/GameItem.sol#143))
            - IERC1155BatchReceiver((operator,to),onERC1155Received(operator,from,id,amount,data)) (node_modules/@openzeppelin/contracts/token/ERC1155/ERC1155.sol#470-478)
        Event emit mint((address,address,uint256,uint256,bool)) (events/GameItem.sol#142)
        - TokenLocked((account,id,amount), (contracts/ERC1155Lockable.sol#141))
        - _lockTokens((to,id,amount), (contracts/GameItem.sol#146))
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3
    Address.verifyCallResult(bool,bytes) (node_modules/@openzeppelin/contracts/token/Address.sol#201-211) uses assembly
        - INLINE ASM (node_modules/@openzeppelin/contracts/token/Address.sol#213-216)
    Utillibrary_based(bytes) (contract/libraries/Utillibrary.sol#23-26) uses assembly
        - INLINE ASM (contract/libraries/Utillibrary.sol#23-26)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage

ERC1155Lockable._rescueBlock(address,uint256) (contracts/ERC1155Lockable.sol#75-90) compares to a boolean constant:
    -require(bool,string)(getRescueUnlockEnabled() == true,RESCUE_NOT_ENABLED: Token is not locked) (contracts/ERC1155Lockable.sol#76-79)
GameItems._beforeTokenTransfer(address,address,address,uint256)(uint256[],bytes) (contracts/GameItems.sol#329-349) compares to a boolean constant:
    -require(bool,string)(to == address(0) || _isOwnerBound(id,from) == false,NOT_BOUND: token top is bound to current owner and cannot be transferred) (contracts/GameItems.sol#341-348)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage

```

GameNFT.sol

```

Utillibrary_based(bytes) (contracts/libraries/Utillibrary.sol#1-62) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_base64_ssm_0 - 2,0x3d3d <> 240) (contracts/libraries/Utillibrary.sol#74)
Utillibrary_based(bytes) (contracts/libraries/Utillibrary.sol#1-62) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_base64_ssm_0 - 1,0x3d <> 240) (contracts/libraries/Utillibrary.sol#77)

TraitConsumer.defaultingURI (contracts/TraitConsumer.sol#183) is never initialized. It is used in:
TraitConsumer.defaultingDescription (contracts/TraitConsumer.sol#208) is never initialized. It is used in:
- TraitConsumer.tokenDescription(uint256) (contracts/TraitConsumer.sol#211-223)
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#uninitialised-state-variables

Utillibrary_based(bytes) (contracts/libraries/Utillibrary.sol#1-62) performs a multiplication on the result of a division:
- encodeMod = 4 * (data.length + 2) / 3) (contracts/libraries/Utillibrary.sol#8)
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#divide-before-multiply

ERC721Lockable.unlock(uint256) (contracts/ERC721Lockable.sol#40-43) uses tx.origin for authorization: require(bool,string)(tx.origin == tx.origin,ORIGIN_NOT_NFT_OWNER): tx.origin must be the owner of the NFT) (contracts/ERC721Lockable.sol#77-78)
ERC721Lockable.lockTokens(uint256) (contracts/ERC721Lockable.sol#49-52) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_LOCK): Only owner can lock token) (contracts/ERC721Lockable.sol#70-73)
ERC721Lockable.unlockToken(uint256) (contracts/ERC721Lockable.sol#49-52) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_UNLOCK): Only owner can unlock token) (contracts/ERC721Lockable.sol#49-53)
GameNFT.lockToken(uint256) (contracts/GameNFT.sol#149-173) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_LOCK): Only owner can lock token) (contracts/GameNFT.sol#65)
GameNFT.unlockToken(uint256) (contracts/GameNFT.sol#149-174) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_UNLOCK): Only owner can unlock token) (contracts/GameNFT.sol#64-67)
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#dangerous-use-of-txorigin

```

```

TraitConsumer.tokenName(uint256) (contracts/TraitConsumer.sol#184-200) compares to a boolean constant:
- hasTrait(tokenId,TraitLibrary.NAME_TRAIT_ID) == true (contracts/TraitConsumer.sol#202)
TraitConsumer.tokenDescription(uint256) (contracts/TraitConsumer.sol#211-223) compares to a boolean constant:
- hasTrait(tokenId,TraitLibrary.DESCRIPTION_TRAIT_ID) == true (contracts/TraitConsumer.sol#217)
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#different-pragma-directives-are-used

Different versions of Solidity are used:
Version used: "1.0.0-rc.5.1"
- 0.8.0 (node_modules/@openzeppelin/contracts/access/Owable.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/security/ReentrancyGuard.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC1155/IERC1155.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC1155/IERC1155Receiver.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC1155/IERC1155MetadataURI.sol#8)
- 0.8.1 (node_modules/@openzeppelin/contracts/math/SafeCast.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/math/SafeMath.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/Introspection.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/Math.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/Address.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/Context.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/Initializable.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/StorageSlot.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC1555.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IGameItems.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/INameRegistry.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/INameSafe.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ILockingSystem.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IRandomizeCallback.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ITraitConsumer.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ITraitProvider.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ISafeCast.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/Utillibrary.sol#8)
- 0.8.0 (node_modules/@openzeppelin/contracts/libraries/Utillibrary.sol#3)
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#different-pragma-directives-are-used

Address.functionCall(address,bytes) (node_modules/@openzeppelin/contracts/utils/Address.sol#85-87) is never used and should be removed
Message.functionCallWithValue(address,bytes,uint256) (node_modules/@openzeppelin/contracts/utils/Address.sol#114-120) is never used and should be removed
Address.functionCallWithValue(address,bytes,uint256, string) (node_modules/@openzeppelin/contracts/utils/Address.sol#120-139) is never used and should be removed
Address.functionCallStatic(address,bytes, string) (node_modules/@openzeppelin/contracts/utils/Address.sol#147-149) is never used and should be removed
Address.functionCallStatic(address,bytes) (node_modules/@openzeppelin/Contracts/utils/Address.sol#157-160) is never used and should be removed
Address.functionCallStatic(address,bytes, string) (node_modules/@openzeppelin/Contracts/utils/Address.sol#160-175) is never used and should be removed
Address.verifyCallResult(bool,bytes, string) (node_modules/@openzeppelin/Contracts/utils/Address.sol#201-221) is never used and should be removed
Contract._initCodeHash(bytes, uint256) (node_modules/@openzeppelin/Contracts/utils/Address.sol#243-248) is never used and should be removed
ERC1155._mint(address,uint256[],bytes) (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#297-315) is never used and should be removed
GameteItem._setGamble(uint256,bytes) (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#297-315) is never used and should be removed
General._setAddress(string,address) (node_modules/@openzeppelin/Contracts/utils/Address.sol#323-324) is never used and should be removed
GameRegistryConsumer._isGameRegistrySet() (contracts/GameRegistryConsumer.sol#45-47) is never used and should be removed
GameRegistryConsumer._requestGameCode(string) (contracts/GameRegistryConsumer.sol#51-57) is never used and should be removed
SafeCast._toBytes32(uint256) (node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#206-209) is never used and should be removed
SafeCast._toBytes32(uint256) (node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#236-240) is never used and should be removed
SafeCast._toBytes32(uint256) (node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#237-241) is never used and should be removed
SafeCast._toBytes32(uint256) (node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#470-473) is never used and should be removed
SafeCast._toBytes32(uint256) (node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#474-477) is never used and should be removed
SafeCast._toBool(uint256) (node_modules/@openzeppelin/Contracts/utils/SafeCast.sol#224-227) is never used and should be removed
SafeCast._toBool(uint256) (node_modules/@openzeppelin/Contracts/utils/SafeCast.sol#471-474) is never used and should be removed
SafeCast._toBool(uint256) (node_modules/@openzeppelin/Contracts/utils/SafeCast.sol#507-510) is never used and should be removed
SafeCast._toBool24(uint256) (node_modules/@openzeppelin/Contracts/utils/SafeCast.sol#52-53) is never used and should be removed
SafeCast._toBool32(uint256) (node_modules/@openzeppelin/Contracts/utils/SafeCast.sol#53-55) is never used and should be removed
SafeCast._toBool64(uint256) (node_modules/@openzeppelin/Contracts/utils/SafeCast.sol#56-58) is never used and should be removed
SafeCast._toBool96(uint256) (node_modules/@openzeppelin/Contracts/utils/SafeCast.sol#59-61) is never used and should be removed
Strings._collectString(uint256) (node_modules/@openzeppelin/Contracts/utils/Strings.sol#10-11) is never used and should be removed
StringMemory._memWrite(string,bytes) (node_modules/@openzeppelin/Contracts/utils/StringMemory.sol#1-2) is never used and should be removed
TraitConsumer._getTraitProvider() (contracts/TraitConsumer.sol#257-258) is never used and should be removed
TraitConsumer._setTraitString(uint256,uint32, string) (contracts/TraitConsumer.sol#325-331) is never used and should be removed
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#vars-code

Pragma version="0.8.0" (node_modules/@openzeppelin/contracts/access/Owable.sol#4) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/contracts/access/Ownable.sol#13) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/contracts/token/ERC1155/IERC1155.sol#1) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#1) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#16) allows old versions
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Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#86) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#87) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#88) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#89) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#90) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#91) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#92) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#93) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#94) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#95) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#96) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#97) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#98) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#99) allows old versions
Pragma version="0.8.0" (node_modules/@openzeppelin/Contracts/utils/introspection/IERC165.sol#100) allows old versions
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#allow-old-versions

lowLevelCall(address,bytes,uint256) (node_modules/@openzeppelin/Contracts/utils/Address.sol#65-66) :
  - (success,returnData) = target.callWithValue(address, bytes, uint256, string) (node_modules/@openzeppelin/Contracts/utils/Address.sol#129-139):
    - (success,returnData) = target.callWithValue(address, bytes, uint256) (node_modules/@openzeppelin/Contracts/utils/Address.sol#137-146):
      - (success,returnData) = target.staticcall(address) (node_modules/@openzeppelin/Contracts/utils/Address.sol#146)
      - (success,returnData) = target.delegatecall(address,bytes, uint256) (node_modules/@openzeppelin/Contracts/utils/Address.sol#184-193):
        - lowLevel call in Address.functionCallWithValue(address,bytes,uint256, string) (node_modules/@openzeppelin/Contracts/utils/Address.sol#125)
  Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#low-level-calls

Variable ERC1155Lockable._lockedTokens (contracts/ERC1155Lockable.sol#183) is not in mixedCase
Parameter GameItems.setPaused(bool) (node_modules/@openzeppelin/Contracts/gameset/GameteItem.sol#65) is not in mixedCase
Variable GameItems._rescuedOnEnabled(bool) (contracts/gameset/GameteItem.sol#48) is not in mixedCase
Variable GameItems._lockedOnDisabled(bool) (contracts/gameset/GameteItem.sol#49) is not in mixedCase
Variable TraitsConsumer._baseTraitURI (contracts/TraitConsumer.sol#220) is not in mixedCase
Variable TraitsConsumer._baseTraitURI108 (contracts/TraitConsumer.sol#313) is not in mixedCase
Variable TraitsConsumer._defaultTraitURI (contracts/TraitConsumer.sol#314) is not in mixedCase
Variable TraitsConsumer._defaultTraitURI108 (contracts/TraitConsumer.sol#315) is not in mixedCase
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

TraitConsumer._defaultTraitURI (contracts/TraitConsumer.sol#155) should be constant
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#state-variables-that-could-be-declared-constant

RenounceOwnership() should be declared external:
- Ownerable.renounceOwnership() (node_modules/@openzeppelin/Contracts/access/Owable.sol#56)
transfersOwnership(address) should be declared external:
- TransfersOwnership.transferOwnership() (node_modules/@openzeppelin/Contracts/access/Ownable.sol#62-65)
uri(uint256) should be declared external:
- ERC1155._uri(uint256) (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#61)
- GameteItem._uri(uint256) (node_modules/@openzeppelin/Contracts/gameset/GameteItem.sol#207-210)
balanceOf(address,uint256) should be declared external:
- ERC1155.balanceOf(address,uint256) (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#298)
setApprovalForAll(address,bytes) should be declared external:
- ERC1155.setApprovalForAll(address, bytes) (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#103-105)
safeTransferFrom(address,address,bytes,uint256,uint256,uint256) should be declared external:
- ERC1155.safeTransferFrom(address,address, bytes, uint256, uint256, bytes) (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#117-129)
safeBatchTransferFrom(address,address,bytes,uint256[],uint256[],bytes) should be declared external:
- ERC1155.safeBatchTransferFrom(address,address, bytes, uint256[], uint256[], bytes) (node_modules/@openzeppelin/Contracts/token/ERC1155/ERC1155.sol#134-146)
setRescueUnlockEnabled(bool) should be declared external:
  - GameteItem.setRescueUnlockEnabled(bool) (contracts/gameset/GameteItem.sol#258)
Reference: https://github.com/crytic/silther/wiki/Detector-Documentation#public-function-that-could-be-declared-external


```

AUTOMATED TESTING

ERC721BridgeableChild.deposit(address,bytes).i (contracts/ERC721BridgeableChild.sol#150) is a local variable never initialized
ERC721BridgeableChild.withdrawBatch(uint256[]).i (contracts/ERC721BridgeableChild.sol#50) is a local variable never initialized
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#uninitialized-local-variables>

ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721.sol#88-409) ignores return value by IERC721Receiver(to).onERC721Received(_msgSender(),from,tokenId,_data) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#398-405)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#ignored-return>

GameNFT.constructor(uint256,string,string,address,name) (contracts/GameNFT.sol#1-100) shadowed
- IERC721Metadata.name() (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC721Metadata.sol#16) (function)
GameNFT.constructor(uint256,string,string,address,symbol) (contracts/GameNFT.sol#111) shadowed
- IERC721Metadata.symbol() (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC721Metadata.sol#21) (function)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#local-variable-shadowing>

ERC721BridgeableChild._withdrawWithMetadata(uint256) (contracts/ERC721BridgeableChild.sol#113-129) has external calls inside a loop: TransferWithMetadata(_msgSender(),address(0),tokenId,this.encodeTokenMetadata(tokenId)) (contracts/ERC721BridgeableChild.sol#112-126)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#calls-inside-a-loop>

Variables ERC721._checkOnERC721Received(address,address,uint256,bytes).retval (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#398) in ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#88-409) ignores return value by IERC721Receiver(to).onERC721Received(_msgSender(),from,tokenId,_data) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#398)
Variable ERC721._checkOnERC721Received(address,address,uint256,bytes).retval (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#397) in ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#88-409) potentially used before declaration: reason.length == 0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#398)
Variable ERC721._checkOnERC721Received(address,address,uint256,bytes).retval (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#397) in ERC721._checkOnERC721Received(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#88-409)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#pre-declaration-use-of-local-variables>

Reentrancy in GameNFT._mint(address,uint256) (contracts/GameNFT.sol#207-224):
External calls:
- super._mint((to,toTokenId)) (contracts/GameNFT.sol#217)
- _checkOnERC721Received((msgSender()),from,toTokenId,_data) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#395-405)
State variable written after the call(s):
- _traitsInitialized[tokenId] = true (contracts/GameNFT.sol#222)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-2>

Reentrancy in ERC721BridgeableChild._deposit(address,bytes) (contracts/ERC721BridgeableChild.sol#139-155):
External calls:
- safeMint((to,toTokenId)) (contracts/ERC721BridgeableChild.sol#143)
- IERC721Receiver(to).onERC721Received((msgSender()),from,toTokenId,_data) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#395-405)
Event emitted after the call(s):
- DepositFromBridge((to,toTokenId)) (contracts/ERC721BridgeableChild.sol#145)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3>

ERC721._checkOnERC721Received(address,uint256,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) uses assembly
- INLINE ASM (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#401-403)
Address.verifyIfEqual(uint,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#201-221) uses assembly
UtilLibrary.based(bytes) (contracts/libraries/UtilLibrary.sol#3-7)
- INLINE ASM (contracts/libraries/UtilLibrary.sol#3-7)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage>

ERC721Lockable.reserveUnlockToken(uint256) (contracts/ERC721Lockable.sol#89-102) compares to a boolean constant:
- require(bool,string).isZero() == false (contracts/ERC721Lockable.sol#89-102) (contract:ERC721Lockable.sol#31-38)
ERC721Lockable.lockTokens(uint256) (contracts/ERC721Lockable.sol#169-182) compares to a boolean constant:
- require(bool,string).isLocked() == false (contracts/ERC721Lockable.sol#169-182) (contract:ERC721Lockable.sol#74-77)
ERC721Lockable.unlockToken(uint256) (contracts/ERC721Lockable.sol#189-202) compares to a boolean constant:
- require(bool,string).isNotLocked() == false (contracts/ERC721Lockable.sol#189-202) (contract:ERC721Lockable.sol#74-77)
ERC721Lockable.performTransferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#111-125) compares to a boolean constant:
- require(bool,string).isLocked((tokenID)) == false (contracts/ERC721Lockable.sol#111-125) (contract:ERC721Lockable.sol#11-16)
GameNFT._safeTransfer(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#230-245) compares to a boolean constant:
- require(bool,string).isNotUnlocked((tokenID)) == false (contracts/GameNFT.sol#230-245) (contract:GameNFT.sol#11-16)
GameNFT._beforeTokenTransfer(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#246-250) compares to a boolean constant:
- require(bool,string).isNotOwner((tokenID)) == false (contracts/GameNFT.sol#246-250) (contract:GameNFT.sol#11-16)
- _hasTrait((tokenID),TraitLibrary.NFT_TRAIT_ID) == true (contracts/TraitConsumer.sol#202)
TraitConsumer.tokenDescription(uint256) (contracts/TraitConsumer.sol#211-223) compares to a boolean constant:
- require(bool,string).isNotOwner((tokenID)) == false (contracts/TraitConsumer.sol#211-223) (contract:TraitConsumer.sol#11-16)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#boolTeam-equality>

Different versions of Solidity is used:
- Version used ("0.8.0", "+0.8.1")
- 0.8.0 (node_modules/@openzeppelin/contracts/access/Ownable.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Receiver.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Enumerable.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Metadata.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721URIStorage.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/Context.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/Strings.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/introspection/IERC165.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/utils/math/SafeMath.sol#4)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721BridgeableChild.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721Lockable.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IEnumerable.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ILockRegistry.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/LockingSystem.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ITradeCallback.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ITraitConsumer.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ITraitConsumer.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/libraries/GameRegistryLibrary.sol#3)
- 0.8.0 (node_modules/@openzeppelin/contracts/libraries/TraitLibrary.sol#3)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#different-pragma-directives-are-used>

ERC721Enumerable._removeTokenFromEnumerable(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/Enumerable.sol#144-162) has costly operations inside a loop:
- delete.allTokensIndex(tokenId) (node_modules/@openzeppelin/contracts/token/ERC721/Enumerable.sol#144-162)
ERC721Enumerable._removeTokenFromAllTokensEnumerable(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/Enumerable.sol#144-162) has costly operations inside a loop:
- _allTokens.pop() (node_modules/@openzeppelin/contracts/token/ERC721/Enumerable.sol#144-162)
ERC721Enumerable._burnToken(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/Enumerable.sol#119-137) has costly operations inside a loop:
- delete.burnedTokensIndex(tokenId) (node_modules/@openzeppelin/contracts/token/ERC721/Enumerable.sol#119-137)
ERC721._burn(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#304-318) has costly operations inside a loop:
- burn((value)) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#304-318)
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#costly-operations-inside-a-loop>

Address.functionCall(address,bytes) (node_modules/@openzeppelin/contracts/utils/Address.sol#87) is never used and should be removed
Address.functionCall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#105-107) is never used and should be removed
Address.functionCallWithValue(address,bytes,uint256) (node_modules/@openzeppelin/contracts/utils/Address.sol#114-120) is never used and should be removed
Address.functionDelegateCall(address,bytes) (node_modules/@openzeppelin/contracts/utils/Address.sol#144-150) is never used and should be removed
Address.functionDelegateCall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#144-153) is never used and should be removed
Address.functionStaticCall(address,bytes) (node_modules/@openzeppelin/contracts/utils/Address.sol#144-149) is never used and should be removed
Address.functionStaticCallWithValue(address,bytes,uint256) (node_modules/@openzeppelin/contracts/utils/Address.sol#144-150) is never used and should be removed
Address.functionSendValue(address,uint256) (node_modules/@openzeppelin/contracts/utils/Address.sol#40-45) is never used and should be removed
Address.verifyCallResult(bool,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#201-221) is never used and should be removed
Contract.functionCall(address,bytes) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#110-117) is never used and should be removed
ERC721._safeMint((to,toTokenId)) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#110-117) is never used and should be removed
GameNFT._setTokenBound(uint256) (node_modules/@openzeppelin/contracts/token/GameNFT.sol#119-199) is never used and should be removed
GameRegistryConsumer._isSameGameRegistrySet() (node_modules/@openzeppelin/contracts/token/GameRegistryConsumer.sol#51-53) is never used and should be removed
GameRegistryConsumer._setHandleWord(uint32) (node_modules/@openzeppelin/contracts/token/GameRegistryConsumer.sol#191-197) is never used and should be removed
SafeCast.toInt16(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#206-209) is never used and should be removed
SafeCast.toInt16x2(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#236-240) is never used and should be removed
SafeCast.toInt32(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#170-173) is never used and should be removed
SafeCast.toInt8(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#224-227) is never used and should be removed
SafeCast.toInt128(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#47-50) is never used and should be removed
SafeCast.toInt256(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#32-35) is never used and should be removed
SafeCast.toInt32x2(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#192-195) is never used and should be removed
SafeCast.toInt96(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#204-207) is never used and should be removed
SafeCast.toInt168(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#218-221) is never used and should be removed
String.toHexEncoding(uint256) (node_modules/@openzeppelin/contracts/utils/Strings.sol#140-141) is never used and should be removed
String.toHexString(uint256) (node_modules/@openzeppelin/contracts/utils/Strings.sol#140-141) is never used and should be removed
TraitConsumer.setTraitJSDOM(uint256,uint32,string) (node_modules/TraitsConsumer.sol#205-231) is never used and should be removed
TraitConsumer.setTraitJSDOM(uint256,uint32,uint32) (node_modules/TraitsConsumer.sol#205-231) is never used and should be removed
Reference: <https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code>

Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/access/Ownable.sol#4) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/math/Math.sol#1) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/token/ERC721/IERC721.sol#4) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/token/ERC721/IERC721Receiver.sol#4) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/token/ERC721/IERC721Enumerable.sol#4) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/token/ERC721/IERC721Metadata.sol#4) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/token/ERC721/IERC721URIStorage.sol#4) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/IERC721BridgeableChild.sol#3) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/IERC721Lockable.sol#3) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/IEnumerable.sol#3) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/ILockRegistry.sol#3) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/LockingSystem.sol#3) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/ITradeCallback.sol#3) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/ITraitConsumer.sol#3) allows old versions
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/ITraitConsumer.sol#3)
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/IEnumerable.sol#3)
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/ILockRegistry.sol#3)
Fragma version="0.8.0" (node_modules/@openzeppelin/contracts/contracts/interfaces/LockingSystem.sol#3)

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Pragma version"0.8.0" (contracts/GameNFT.sol#8) allows old versions
Pragma version"0.8.0" (contracts/GameRegistryConsumer.sol#8) allows old versions
Pragma version"0.8.0" (contracts/TraitsConsumer.sol#8) allows old versions
Pragma version"0.8.0" (contracts/interfaces/IERC721Enumerable.sol#8) is never used and should be removed
Pragma version"0.8.0" (contracts/interfaces/IERC721EnumerableChild.sol#8) is never used and should be removed
Pragma version"0.8.0" (contracts/interfaces/IGameNFT.sol#8) allows old versions
Pragma version"0.8.0" (contracts/interfaces/IGameRegistry.sol#8) allows old versions
Pragma version"0.8.0" (contracts/interfaces/IHandsome.sol#8) allows old versions
Pragma version"0.8.0" (contracts/interfaces/IHandsomeCallback.sol#8) allows old versions
Pragma version"0.8.0" (contracts/interfaces/IHandsomeStorage.sol#8) allows old versions
Pragma version"0.8.0" (contracts/interfaces/ITraitsProvider.sol#8) allows old versions
Pragma version"0.8.0" (contracts/libraries/GameRegistryLibrary.sol#8) allows old versions
Pragma version"0.8.0" (contracts/libraries/UtilLibrary.sol#8) allows old versions
Pragma version"0.8.0" (contracts/libraries/UtilLibrary.sol#8) allows old versions
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in Address.sendValue(address,uint256) (node_modules/@openzeppelin/contracts/utils/Address.sol#60-65):
  - (success) = recipient.call.value(amount) (node_modules/@openzeppelin/contracts/utils/Address.sol#8)
Low level call in Address.transferFrom(address,address,uint256,bytes) (node_modules/@openzeppelin/contracts/utils/Address.sol#120-139):
  - (success,returnData) = target.delegatecall(value)(data) (node_modules/@openzeppelin/contracts/utils/Address.sol#137)
Low level call in Address.functionStaticCall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#157-160):
  - (success,returnData) = target.functionStaticCall(data) (node_modules/@openzeppelin/contracts/utils/Address.sol#158)
Low level call in Address.functionDelegatecall(address,bytes,string) (node_modules/@openzeppelin/contracts/utils/Address.sol#159-163):
  - (success,returnData) = target.delegatecall(data) (node_modules/@openzeppelin/contracts/utils/Address.sol#161)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Parameter ERC721.safeTransferFrom(address,address,uint256,bytes) (data) (node_modules/@openzeppelin/contracts/token/ERC721.sol#179) is not in mixedCase
Variable GameNFT._maxSupply (contracts/GameNFT.sol#25) is not in mixedCase
Variable TraitsConsumer._baseImageURI (contracts/TraitsConsumer.sol#28) is not in mixedCase
Variable TraitsConsumer._baseExternalURI (contracts/TraitsConsumer.sol#31) is not in mixedCase
Variable TraitsConsumer._externalImageURI (contracts/TraitsConsumer.sol#32) is not in mixedCase
Variable TraitsConsumer._defaultDescription (contracts/TraitsConsumer.sol#38) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

TraitsConsumer.defaultDescription (contracts/TraitsConsumer.sol#38) should be constant
TraitsConsumer.defaultImageURI (contracts/TraitsConsumer.sol#38) should be constant
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variables-that-could-be-declared-constant

renounceOwnership() should be declared external;
  - Ownable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Ownable.sol#56)
transferFromOwnership(address) should be declared external;
  - Ownable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Ownable.sol#62-65)
name() should be declared external;
  - ERC721.name() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#79-81)
symbol() should be declared external;
  - ERC721.symbol() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#86-88)
approve(address,uint256) should be declared external;
  - ERC721.approve(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#112-122)
setApprovalForAll(address,bool) should be declared external;
  - ERC721.setApprovalForAll(address,bool) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#136-139)
transferFrom(address,address,uint256) should be declared external;
  - ERC721.transferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#150-159)
safeTransferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#166-170)
tokenOfOwnerByIndex(address,uint256) should be declared external;
  - ERC721.tokenOfOwnerByIndex(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#37-40)
tokenByIndex(uint256) should be declared external;
  - ERC721Enumerable.tokenByIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#52-55)
setReserveToken(string) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#100-102)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

GameRegistry.sol

```

Context, msgData() (node_modules/@openzeppelin/contracts/utils/Context.sol#21-23) is never used and should be removed
ERC20._burn(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#280-295) is never used and should be removed
ERC20._mint(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#296-301) is never used and should be removed
String, toString(uint256) (node_modules/@openzeppelin/contracts/utils/String.sol#10-11) is never used and should be removed
String, toString(uint256) (node_modules/@openzeppelin/contracts/utils/String.sol#15-25) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#read-code

Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/access/AccessControl.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/access/AccessControl.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/access/Ownable.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/token/ERC20/IERC20.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/token/ERC20/IERC20.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/utils/Context.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/utils/Strings.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/utils/introspection/IERC165.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IERC165.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IERC165.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IERC20.sol#8) allows old versions
decimals() should be declared external;
  - ERC20.decimals() (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#87-89)
totalSupply() (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#94-96)
balanceOf(address) should be declared external;
  - ERC20.balanceOf(address) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#101-103)
transfer(address,uint256) should be declared external;
  - ERC20.transfer(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#113-117)
approve(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#136-140)
transferFrom(address,address,uint256) should be declared external;
  - ERC20.transferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#150-167)
increaseAllowance(address,uint256) should be declared external;
  - ERC20.increaseAllowance(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#201-210)
decreaseAllowance(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#201-210)
hasAccessRole(bytes32,address) should be declared external;
  - GameRegistry.hasAccessRole(bytes32,address) (contracts/GameRegistry.sol#265-272)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

GameRegistryConsumer.sol

```

Context, msgData() (node_modules/@openzeppelin/contracts/utils/Context.sol#21-23) is never used and should be removed
GameRegistryConsumer._checkRole(bytes32,address) (contracts/GameRegistryConsumer.sol#73-77) is never used and should be removed
GameRegistryConsumer._hasAccessRole(bytes32,address) (contracts/GameRegistryConsumer.sol#58-64) is never used and should be removed
GameRegistryConsumer._isGameRegistryConsumer() (contracts/GameRegistryConsumer.sol#50-53) is never used and should be removed
GameRegistryConsumer._requestRandomWords(uint32) (contracts/GameRegistryConsumer.sol#80-81) is never used and should be removed
GameRegistryConsumer._requestRandomWords(uint32) (contracts/GameRegistryConsumer.sol#91-97) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/access/Ownable.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/access/Ownable.sol#8) allows old versions
Pragma version"0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IERC165.sol#8) allows old versions
renounceOwnership() should be declared external;
  - Ownable.renounceOwnership() (node_modules/@openzeppelin/contracts/access/Ownable.sol#54-56)
transferOwnership(address) should be declared external;
  - Ownable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Ownable.sol#62-65)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

GoldToken.sol

```

Context._msgData) (node_modules/@openzeppelin/contracts/utils/Context.sol#21-23) is never used and should be removed
GameRegistryConsumer._isGameRegistrySet() (contracts/GameRegistryConsumer.sol#51-53) is never used and should be removed
GameRegistryConsumer._requestRandomWords(uint32) (contracts/GameRegistryConsumer.sol#91-97) is never used and should be removed
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#dead-code

Frama version>0.8.0 (node_modules/@openzeppelin/contracts/access/Omable.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/token/ERC20/extensions/IERC20Metadata.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/utils/Context.sol#4) allows old version
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/utils/Address.sol#4) allows old versions
Frama version>0.8.0 (contracts/GameRegistryConsumer.sol#3) allows old versions
Frama version>0.8.0 (contracts/GoldToken.sol#3) allows old versions
Frama Version>0.8.0 (contracts/interfaces/IGameRegistry.sol#3) allows old versions
Frama Version>0.8.0 (contracts/interfaces/ILockSystem.sol#3) allows old versions
Frama Version>0.8.0 (contracts/interfaces/IHandcrazier.sol#3) allows old versions
Frama Version>0.8.0 (contracts/libraries/GameRegistryLibrary.sol#3) allows old versions
Frama Version>0.8.0 (contracts/libraries/GameRegistryLibrary.sol#3) allows old versions
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#incorrect-versions-of-solidity

renounceOwnership() should be declared external;
    - Ownable renounceOwnership() (node_modules/@openzeppelin/contracts/access/Omable.sol#54-56)
transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Omable.sol#42-65)
name() should be declared external;
    - ERC20 symbol() (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#70-72)
decimals() (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#87-89)
totalSupply() should be declared external;
    - ERC20 totalSupply() (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#894-96)
balanceOf(address) should be declared external;
    - ERC20 balanceOf(address) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#101-103)
transfer(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#113-116)
approve(address,uint256) should be declared external;
    - ERC20 approve(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#136-140)
increaseAllowance(address,uint256) should be declared external;
    - ERC20.increaseAllowance(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#181-185)
decreaseAllowance(address,uint256) should be declared external;
    - ERC20.decreaseAllowance(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC20/ERC20.sol#182-210)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

LockingSystem.sol

```

LockingSystem.reserveNFT(address,uint256) (contracts/LockingSystem.sol#505-528) deletes LockingSystem.NFTLockStatus (contracts/LockingSystem.sol#56-65) which contains a mapping:
    - _lockedNFTs[(tokenContract)][tokenId] (contracts/LockingSystem.sol#52)
LockingSystem.rescueNFT(address,address,uint256) (contracts/LockingSystem.sol#535-545) deletes LockingSystem.ItemLockStatus (contracts/LockingSystem.sol#68-81) which contains a mapping:
    - _lockedItems[(tokenContract)][itemID] (contracts/LockingSystem.sol#70)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#deletion-on-mapping-containing-a-structure

LockingSystem.setPaused(bool) _paused (contracts/LockingSystem.sol#104) shadows:
    - Pausable (node_modules/@openzeppelin/contracts/security/Pausable.sol#28) (state variable)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#local-variable-shadowing

LockingSystem.lockItem(address,address,uint256,uint256) (contracts/LockingSystem.sol#726-734) has external calls inside a loop: IGameItems(cokenContract).lockToken(account,tokenId,amount) (contracts/LockingSystem.sol#733)
LockingSystem.unlockItem(address,address,uint256,uint256) (contracts/LockingSystem.sol#736-759) has external calls inside a loop: amountlocked = ERC1155Lockable(tokenContract).amountlocked(account,tokenId) (contracts/LockingSystem.sol#747)
TotalSupply() (contracts/LockingSystem.sol#766-770) has external calls inside a loop: _itemAmountAvailableForUnlock(lockStatus,amountLocked) (contracts/LockingSystem.sol#770)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#calls-inside-a-loop

LockingSystem.addNFTReservation(address,uint256,bool,uint32) (contracts/LockingSystem.sol#241-291) compares to a boolean constant:
    - require(bool,string)(tokenContract,_isLocked(tokenId)) == true,NFT is not locked, cannot be reserved (contracts/LockingSystem.sol#255-258)
LockingSystem.addItemReservation(address,uint256,bytes32,uint32) (contracts/LockingSystem.sol#373-396) compares to a boolean constant:
    - require(bool,string)(itemID,_isExclusive(itemID)) == true,Item is not exclusive, cannot be reserved
LockingSystem.addItemReservation(address,address,uint256,uint32) (contracts/LockingSystem.sol#351-415) compares to a boolean constant:
    - require(bool,string)(exclusive == false || amount < amountLocked, lockStatus.amountExclusiveAvailableForUnlock(lockStatus,amountLocked) >= amount) || _itemAmountAvailableForUnlock(lockStatus,amountLocked) >= amount,NOT_ENOUGH_LOCKED_TOKENS: Not enough tokens available
LockingSystem.removeItemReservation(address,address,uint256) (contracts/LockingSystem.sol#425-496) compares to a boolean constant:
    - otherReservation.exclusive == false || otherReservation.amount == max((contracts/LockingSystem.sol#471-472))
LockingSystem.rescueNFTEnabled(bool) (contracts/LockingSystem.sol#512-515) compares to a boolean constant:
    - require(bool,string)(rescueUnlockEnabled == true,RESCUE NOT ENABLED: Rescue mode not enabled) (contracts/LockingSystem.sol#512-515)
LockingSystem.rescueNFTItem(address,address,uint256) (contracts/LockingSystem.sol#537-565) compares to a boolean constant:
    - require(bool,string)(itemID != 0,Item ID cannot be zero) (contracts/LockingSystem.sol#541-545)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#local-variable-equality

Context._msgData) (node_modules/@openzeppelin/contracts/utils/Context.sol#21-23) is never used and should be removed
Counters.decrement(Counters.Counter) (node_modules/@openzeppelin/contracts/utils/Counters.sol#32-38) is never used and should be removed
Counters.reset(Counters.Counter) (node_modules/@openzeppelin/contracts/utils/Counters.sol#40-42) is never used and should be removed
GameRegistryConsumer._isGameRegistrySet() (contracts/GameRegistryConsumer.sol#51-53) is never used and should be removed
GameRegistryConsumer._requestRandomWords(uint32) (contracts/GameRegistryConsumer.sol#91-97) is never used and should be removed
SafeCast.toInt256(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#206-209) is never used and should be removed
SafeCast.toInt256(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#210-213) is never used and should be removed
SafeCast.toInt32(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#214-217) is never used and should be removed
SafeCast.toInt32(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#218-221) is never used and should be removed
SafeCast.toInt24(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#224-227) is never used and should be removed
SafeCast.toInt24(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#228-231) is never used and should be removed
SafeCast.toInt24x3(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#232-235) is never used and should be removed
SafeCast.toInt24x3(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#236-239) is never used and should be removed
SafeCast.toInt32x3(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#240-243) is never used and should be removed
SafeCast.toInt32x3(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#244-247) is never used and should be removed
SafeCast.toInt24x4(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#248-251) is never used and should be removed
SafeCast.toInt24x4(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#252-255) is never used and should be removed
SafeCast.toInt24x4x2(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#256-259) is never used and should be removed
SafeCast.toInt24x4x2(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#260-263) is never used and should be removed
SafeCast.toInt24x4x2x2(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#264-267) is never used and should be removed
SafeCast.toInt24x4x2x2(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#268-271) is never used and should be removed
SafeCast.toInt24x4x2x2x2(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#272-275) is never used and should be removed
SafeCast.toInt24x4x2x2x2(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#276-279) is never used and should be removed
SafeCast.toInt24x4x2x2x2x2(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#280-283) is never used and should be removed
SafeCast.toInt24x4x2x2x2x2(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#284-287) is never used and should be removed
SafeCast.toInt24x4x2x2x2x2x2(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#288-291) is never used and should be removed
SafeCast.toInt24x4x2x2x2x2x2(int256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#292-295) is never used and should be removed
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#dead-code

Frama version>0.8.0 (node_modules/@openzeppelin/contracts/access/Omable.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721Enumerable.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721Metadata.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721Receiver.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721URI.sol#4) allows old versions
Frama version>0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC1155.sol#4) allows old versions
Frama Version>0.8.0 (contracts/IERC721.sol#3) allows old versions
Frama Version>0.8.0 (contracts/IERC721Enumerable.sol#3) allows old versions
Frama Version>0.8.0 (contracts/IERC721Metadata.sol#3) allows old versions
Frama Version>0.8.0 (contracts/IERC721Receiver.sol#3) allows old versions
Frama Version>0.8.0 (contracts/IERC721URI.sol#3) allows old versions
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#incorrect-versions-of-solidity

Parameter LockingSystem.setNFTReservation(address,uint256,bytes32,bool) _lockedNFTs (contracts/LockingSystem.sol#107-119) is not in mixedCase
Parameter LockingSystem.setNFTReservation(address,uint256,bytes32,bool) _lockedNFTs (contracts/LockingSystem.sol#107-119) is not in mixedCase
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#solidity-naming-conventions

renounceOwnership() should be declared external;
    - Ownable renounceOwnership() (node_modules/@openzeppelin/contracts/access/Omable.sol#54-56)
transferOwnership(address) should be declared external;
    - Ownable transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Omable.sol#42-65)
supportsInterface(bytes4) should be declared external;
    - LockingSystem.supportsInterface(bytes4) (contracts/LockingSystem.sol#707-717)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

PirateGameV1.sol

```

Reentrancy in PirateGameV1.fillRandomWordsCallback(uint256,uint256[]) (contracts/PirateGameV1.sol#201-216):
    - _finisheMintShips(receipt.account,request.amount,request.numWords,(contracts/PirateGameV1.sol#207-212)
        - _gameItems.mint(to,navyShipType1,numMintedShips,lock) (contracts/PirateGameV1.sol#51)
    State Variable written after the call();
        - _gameItems.mint(to,navyShipType1,numMintedShips,lock) (contracts/PirateGameV1.sol#51)
    External call();
        - gameRegistry.getRandomeizer().requestRandomWords(IRandomizeCallback(this),numWords) (contracts/GameRegistryConsumer.sol#92-96)
    State Variable written after the call();
        - _gameItems.mint(to,navyShipType1,numMintedShips,lock) (contracts/PirateGameV1.sol#51)
        - mintPending += amount (contracts/PirateGameV1.sol#473)
Reentrancy in PirateGameV1.mintCaptainNFT(address,uint16) (contracts/PirateGameV1.sol#182-198):
    External call();
        - gameRegistry.getRandomeizer().requestRandomWords(IRandomizeCallback(this),numWords) (contracts/GameRegistryConsumer.sol#92-96)
    State Variable written after the call();
        - _gameItems.mint(to,navyShipType1,numMintedShips,lock) (contracts/PirateGameV1.sol#51)
        - mintPending += amount (contracts/PirateGameV1.sol#473)
Reentrancy in PirateGameV1.setCaptainNFT(address,uint16) (contracts/PirateGameV1.sol#267-323):
    External call();
        - lockingSystem.removeNFTReservation(captainNFT.tokenContract,captainNFT.tokenId,captainNFT.reservationId) (contracts/PirateGameV1.sol#277-281)
        - lockingSystem.setNFTReservation(captainNFT.tokenContract,captainNFT.tokenId,captainNFT.reservationId) (contracts/PirateGameV1.sol#278)
    State Variable written after the call();
        - captainNFT.tokenContract = tokenContract (contracts/PirateGameV1.sol#302)
        - captainNFT.tokenId = tokenId (contracts/PirateGameV1.sol#303)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#incorrect-versions-of-solidity

```

PirateNFT.sol

```

Utilibary, based(0bytes) (contracts/libraries/Utilibary.sol#1-62) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_base64,asm 0 - 2,0x3d3d <> 240) (contracts/libraries/Utilibary.sol#74)
Utilibary, based(4bytes) (contracts/libraries/Utilibary.sol#1-62) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_base64,asm 0 - 1,0x3d <> 248) (contracts/libraries/Utilibary.sol#77)

Utilibary, based(0bytes) (contracts/libraries/Utilibary.sol#1-62) performs a multiplication on the result of a division:
    - encodeDiv = 4 * (data.length - 3) / 3) (contracts/libraries/Utilibary.sol#8)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#divide-before-multiply

ERC721Lockable, lockModule(uint256) (contracts/ERC721Lockable.sol#10-65) uses tx.origin for authorization: require(bool,string)(ownerOf(tokenId)) == tx.origin,ORIGIN_NOT_OWNER: tx.origin must be the owner of the NFT (contracts/ERC721Lockable.sol#10-65)
ERC721Lockable, lockModule(uint256) (contracts/ERC721Lockable.sol#10-65) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_LOCK: Only owner can lock token) (contracts/ERC721Lockable.sol#70-75)
ERC721Lockable, unlockToken(uint256) (contracts/ERC721Lockable.sol#109-102) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_UNLOCK: Only owner can unlock token) (contracts/ERC721Lockable.sol#109-103)
GameNFT.lockModule(uint256) (contracts/GameNFT.sol#10-64) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_LOCK: Only owner can lock token) (contracts/GameNFT.sol#104-105)
GameNFT.unlockModule(uint256) (contracts/GameNFT.sol#10-64) uses tx.origin for authorization: require(bool,string)(tx.origin == ownerOf(tokenId),ONLY_OWNER_CAN_UNLOCK: Only owner can unlock token) (contracts/GameNFT.sol#104-105)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dangerous-use-of-txorigin

ERC721BridgeableChild, depositAddress(bytes)_i (contracts/ERC721BridgeableChild.sol#150) is a local variable never initialized
ERC721BridgeableChild, withdrawAddress(uint256)_i (contracts/ERC721BridgeableChild.sol#51) is a local variable never initialized
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#uninitialized-local-variables

```

```

Reentrancy in PirateGameV1.setCaptainNFT(address,uint256) (contracts/PirateGameV1.sol#18267-323):
External calls:
- lockingSystem.removeReservation(captainNFT.tokenContract,captainNFT.tokenId,captainNFT.reservationId) (contracts/PirateGameV1.sol#277-281)
- lockingSystem.reserveNFT(uint256,address)(contracts/PirateGameV1.sol#282-285)
State variable written after the call(s):
- captainNFT.reservationId = lockingSystem.addNFTReservation(tokenContract,tokenId,false,0) (contracts/PirateGameV1.sol#306-311)
Reentrancy in PirateGameV1.setCaptainNFT(address,uint256) (contracts/PirateGameV1.sol#24267-333):
External calls:
- lockingSystem.removeReservation(captainNFT.tokenContract,captainNFT.tokenId,captainNFT.reservationId) (contracts/PirateGameV1.sol#277-281)
- lockingSystem.reserveNFT(uint256,address)(contracts/PirateGameV1.sol#282-285)
State variables updated:
- captainNFT.tokenContract = lockingSystem.addNFTReservation(tokenContract,tokenId,false,0) (contracts/PirateGameV1.sol#306-311)
- captainNFT.tokenId = 0 (contracts/PirateGameV1.sol#1818)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-19
9
PirateGameV1.mintNFT(uint256) (contracts/PirateGameV1.sol#182-198) uses tx.origin for authorization: require(bool,string)(tx.origin == _msgSender(),ONLY_EOA_CALLER: Only EOA may call this function) (contracts/PirateGameV1.sol#187-191)
PirateGameV1.setCaptainNFT(address,uint256) (contracts/PirateGameV1.sol#242-243) uses tx.origin for authorization: require(bool,string)(IGameNFT(tokenContract).ownerOf(tokenId) == tx.origin,ORIGIN_NOT_OWNER_OF_NFT: Origin is not the owner of the specified NFT) (contracts/PirateGameV1.sol#252-255)
PirateGameV1.claimFreeShip(uint256) (contracts/PirateGameV1.sol#1823-249) has external calls inside a loop: require(bool,string)(pirateNFT.ownerOf(tokenId) == _msgSender(),SENDER_NOT_OWNER: Sender does not own the given NFT) (contracts/PirateGameV1.sol#1823-237)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#calls-inside-a-loop
Reentrancy in PirateGameV1.mintShips(address,uint32,bytes) (contracts/PirateGameV1.sol#45-47):
External calls:
- requestForRandomWords(1) (contracts/PirateGameV1.sol#45)
- GameRegistry.getRandomeeRequestID() (contracts/PirateGameV1.sol#45)
State variable written after the call(s):
- numWords = GameRegistry.getRandomeeRequestID() (contracts/PirateGameV1.sol#45-47)
- withdrawRequestID = VRPRequest(txAmount,lock) (contracts/PirateGameV1.sol#46-470)
Reentrancy in PirateGameV1.mintShip(uint32,bool) (contracts/PirateGameV1.sol#182-198):
External calls:
- mintShips(_msgSender(),price) (contracts/PirateGameV1.sol#185)
- numWords = GameRegistry.getRandomeeRequestID() (contracts/PirateGameV1.sol#187)
State variable updated:
- mintShips(_msgSender(),amount,lock) (contracts/PirateGameV1.sol#189)
State variable written after the call(s):
- numWords = GameRegistry.getRandomeeRequestID() (contracts/PirateGameV1.sol#189-190)
Event emitted after the call(s):
- VRPRequest(txAmount,lock) (contracts/PirateGameV1.sol#194)
Reentrancy in PirateGameV1.setCaptainNFT(address,uint256) (contracts/PirateGameV1.sol#24267-323):
External calls:
- lockingSystem.removeReservation(captainNFT.tokenContract,captainNFT.tokenId,captainNFT.reservationId) (contracts/PirateGameV1.sol#277-281)
- lockingSystem.lockNFT(uint256,address)(contracts/PirateGameV1.sol#282-285)
- captainNFT.setOwnerOf(tx.origin,pirateNFT.ownerOf(tokenId)) (contracts/PirateGameV1.sol#306-311)
Event emitted after the call(s):
- SetCaptain(tx.origin,tokenContract,tokenId) (contracts/PirateGameV1.sol#1814)
Reentrancy in PirateGameV1.setCaptainNFT(address,uint256) (contracts/PirateGameV1.sol#24267-323):
External calls:
- lockingSystem.removeReservation(captainNFT.tokenContract,captainNFT.tokenId,captainNFT.reservationId) (contracts/PirateGameV1.sol#277-281)
Event emitted after the call(s):
- SetCaptain(tx.origin,tokenContract,tokenId) (contracts/PirateGameV1.sol#1814)
Reentrancy in PirateGameV1.upgradeFirstCommandRank(address,uint256) (contracts/PirateGameV1.sol#345-391):
External calls:
- ITradeConsumer(tx.origin,pubRequired) (contracts/PIerGameV1.sol#345)
- ITradeConsumer(nftContractId,traitNonce,TraitsLibrary.COMMAND_RANK_TRAIT_ID) (contracts/PirateGameV1.sol#385-387)
Event emitted after the call(s):
- UpgradeCommandRank(address,traitNonce) (contracts/PirateGameV1.sol#193)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3
PirateGameV1.claimFreeShip(uint256) (contracts/PirateGameV1.sol#1823-251) compare as a boolean constant:
- require(bool,_isAlreadyClaimed(tokenId) == false,SHIP_ALREADY_CLAIMED: Pirate has already claimed their free ship) (contracts/PirateGameV1.sol#230-233)
PirateGameV1.setCaptainNFT(address,uint256) (contracts/PirateGameV1.sol#242-253) compare to a boolean constant:
- require(bool,_isNotNFT(pirateNFT.ownerOf(tokenId)) == true,SHIP_NOT_PIRATE: NFT is not a pirate NFT) (contracts/PirateGameV1.sol#256-259)
PirateGameV1.setFirstCommandRank(address,uint256) (contracts/PirateGameV1.sol#345-356) compare to a boolean constant:
- lockingSystem.lockNFT(tokenContract,tokenId) (contracts/PirateGameV1.sol#345-347)
GameHelperLibrary._isPirateShip(IGameItem, uint256) (contracts/libraries/GameHelperLibrary.sol#47-63) compare to a boolean constant:
    - _isPirateShip((IGameItem)pirateNFT, address(pirateNFT)) (contracts/libraries/GameHelperLibrary.sol#47-63).getTraitInt256(tokenId,TraitsLibrary.IS_NAVY_TRAIT_ID) != 1 (contracts/libraries/GameHelperLibrary.sol#48-62)
GameHelperLibrary._isNavyShip(IGameItem, uint256) (contracts/libraries/GameHelperLibrary.sol#66-82) compare to a boolean constant:
    - _isNavyShip((IGameItem)pirateNFT, address(pirateNFT)) (contracts/libraries/GameHelperLibrary.sol#66-82).getTraitInt256(tokenId,TraitsLibrary.IS_NAVY_TRAIT_ID) == 1 (contracts/libraries/GameHelperLibrary.sol#71-81)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#bool-equality

Context, msgData() (node_modules/@openzeppelin/contracts/access/Ownable.sol#23) is never used and should be removed
GameHelperLibrary._isNavyShip(IGameItem, uint256) (contracts/libraries/GameHelperLibrary.sol#66-82) is never used and should be removed
GameHelperLibrary._isPirateShip(IGameItem, uint256) (contracts/libraries/GameHelperLibrary.sol#47-63) is never used and should be removed
GameRegistryConsumer._isGameRegistrySet() (contracts/libraries/GameRegistryConsumer.sol#51-53) is never used and should be removed
Math.sqrt(maxInt256, uint256) (node_modules/@openzeppelin/contracts/math/Math.sol#4-15) is never used and should be removed
Math.sqrt(maxInt256, uint256) (node_modules/@openzeppelin/contracts/math/Math.sol#16-25) is never used and should be removed
Math.sqrt(maxInt256, uint256) (node_modules/@openzeppelin/contracts/math/Math.sol#26-35) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#bool-equality

Context, msgData() (node_modules/@openzeppelin/contracts/access/Ownable.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/access/Ownable.sol#44) is never used and should be removed
Context, msgData() (node_modules/@openzeppelin/contracts/security/Pausable.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/security/Pausable.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/token/ERC115/IERC115.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/token/ERC20/IERC20.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Enumerable.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/utils/Context.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/utils/intmath/Math.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/utils/math/Math.sol#44) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/interfaces/IERC721Lockable.sol#3) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/interfaces/IQuesenFT.sol#3) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/interfaces/IQuesenFT.sol#3) allows old versions
Freme Version 0.5.0 (node_modules/@openzeppelin/contracts/interfaces/ITradingConsumer.sol#3) allows old versions
Variable PirateGameV1.SHIP_MAX_SUPPLY (contracts/PirateGameV1.sol#10-62) is not in mixedCase
Variable PirateGameV1.XP_PER_COMMAND_RANK (contracts/PirateGameV1.sol#345-391) is not in mixedCase
Variable PirateGameV1.NFT_MAX_SUPPLY (contracts/PirateGameV1.sol#10-62) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#non-camel-case-variable-naming-conventions

renounceOwnership() should be declared external:
- Owable.renounceOwnership() (node_modules/@openzeppelin/contracts/access/Owable.sol#5-6)
transferOwnership(address) should be declared external:
- Owable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Owable.sol#45-46)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

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AUTOMATED TESTING

PirateNFTParent.sol

```

PiratenVersion "0.8.0" (contracts/interfaces/IERC721EnumerableChild.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/IERC721Lockable.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/IDaoNFT.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/IDaoRegistry.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/INameNFT.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/IRandomizer.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/IRandomizerCallback.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/ITraitConsumer.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/interfaces/ITraitConsumer.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/libraries/GameRegistryLibrary.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/libraries/Address.sol#8) allows old versions
PiratenVersion "0.8.0" (contracts/libraries/UtilLibrary.sol#8) allows old versions
References: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in Address.sendValue(address,uint256) (node_modules/Openzeppelin/contracts/utils/Address.sol#60-65):
  - (success) = recipient.call{value:(amount)} (node_modules/Openzeppelin/contracts/utils/Address.sol#68)
Low level call in Address.functionStaticCall(addresses,bytes,string) (node_modules/Openzeppelin/contracts/utils/Address.sol#120-139):
  - (success,returnData) = target.call{value:(value)}(data) (node_modules/Openzeppelin/contracts/utils/Address.sol#137)
Low level call in Address.functionDelegateCall(addresses,bytes,string) (node_modules/Openzeppelin/contracts/utils/Address.sol#157-166):
  - (success,returnData) = target.delegatecall(data) (node_modules/Openzeppelin/contracts/utils/Address.sol#158)
Low level call in Address.functionStaticCall(address,bytes,string) (node_modules/Openzeppelin/contracts/utils/Address.sol#154-159):
  - (success,returnData) = target.functionStaticcall(data) (node_modules/Openzeppelin/contracts/utils/Address.sol#159)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Parameter ERC721.safeTransferFrom(address,address,uint256,bytes).data (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#179) is not in mixedCase
Variable GameNFT._maxSupply (contract/IERC721/ERC721.sol#8) is not in mixedCase
Variable _name (string) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#10) is not in mixedCase
Variable _symbol (string) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#10) is not in mixedCase
Variable TraitsConsumer._baseImageURI (contract/TraitsConsumer.sol#28) is not in mixedCase
Variable TraitsConsumer._baseMetadataURI (contract/TraitsConsumer.sol#28) is not in mixedCase
Variable TraitsConsumer._defaultDescription (contract/TraitsConsumer.sol#38) is not in mixedCase
References: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

renounceOwnership() should be declared external:
  - Ownable.renounceOwnership() (node_modules/Openzeppelin/contracts/access/Ownable.sol#54-56)
transferOwnership(address) should be declared external:
  - Ownable.transferOwnership(address) (node_modules/Openzeppelin/contracts/access/Ownable.sol#62-65)
name() should be declared external:
  - ERC721.name() (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#47-51)
symbol() should be declared external:
  - ERC721.symbol() (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#46-48)
approve(address,uint256) should be declared external:
  - ERC721.approve(address,uint256) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#112-122)
setApprovalForAll(address,bool) should be declared external:
  - ERC721.setApprovalForAll(address,bool) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#136-138)
transferFrom(address,to,address,uint256) should be declared external:
  - ERC721.transferFrom(address,to,address,uint256) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#150-159)
safeTransferFrom(address,to,address,uint256) should be declared external:
  - ERC721.safeTransferFrom(address,to,address,uint256) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#164-170)
tokenOfOwnerByIndex(address,uint256) should be declared external:
  - ERC721.tokenOfOwnerByIndex(address,uint256) (node_modules/Openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#57-60)
tokensOfOwner(address,uint256) should be declared external:
  - ERC721Enumerable.tokensOfOwner(address,uint256) (node_modules/Openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol#52-55)
setRescueBlockEnabled(bool) should be declared external:
  - GameNFT.setRescueBlockEnabled(bool) (contract/GameNFT.sol#100-103)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

https://github.com/crytic/slither/wiki/Detector-Documentation#unused-return

ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) ignores return value by IERC721Receiver(to).onERC721Received(_msgSender(),from,_tokenId,_data) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#388-409)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-return

ERC721BridgeableParent.constructor(string,string,uint256) (name, contact/ERC721BridgeableParent.sol#9) shadows:
  - ERC721._name (string) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#114) (state variable)
ERC721BridgeableParent.constructor(string,string,uint256) (symbol, contact/ERC721BridgeableParent.sol#10) shadows:
  - ERC721._symbol (string) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#7) (state variable)
PirateNFT._name (string) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#10) shadows:
  - ERC721BridgeableParent._name (contact/ERC721BridgeableParent.sol#15) (state variable)
PirateNFT._symbol (string) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#7) shadows:
  - ERC721BridgeableParent._symbol (contact/ERC721BridgeableParent.sol#16) (state variable)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#local-variable-shadowing

Variable _ERC721BridgeableParent._checkERC721Received(address,address,uint256,bytes).retval (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#395) in ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) potentially used before declaration: retval == IERC721Receiver.selector (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#396)
Variable _ERC721BridgeableParent._checkERC721Received(address,address,uint256,bytes).returnData (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#395) in ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) potentially used before declaration: returnData == IERC721Receiver.onERC721Received(address,from,_tokenId,_data) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#396)
Variable _ERC721BridgeableParent._checkERC721Received(address,address,uint256,bytes).reason (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#395) in ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) potentially used before declaration: revert(uint256,uint256)(x2 + reason, blooed(uint256)(x2)) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#402)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#declaration-usage-of-local-variable

Reentrancy in ERC721BridgeableParent.mint(address,uint256):
  External calls:
    - _safeMint((to) (contract/ERC721BridgeableParent.sol#8))
      - IERC721Receiver(to).onERC721Received(_msgSender(),from,_tokenId,_data) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#395-405)
State variables:
  - _setTokenMetadata((tokenId,metadata) (contract/ERC721BridgeableParent.sol#8))
    - _tokenData((tokenId) (data contract/ERC721BridgeableParent.sol#179))
References: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-2

ERC721._checkERC721Received(address,address,uint256,bytes) (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#388-409) uses assembly
Address.verifyCallResult(bool,bytes,string) (node_modules/Openzeppelin/contracts/utils/Address.sol#201-221) uses assembly
- INLINE ASM (node_modules/Openzeppelin/contracts/utils/Address.sol#212-216)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly

ERC721BridgeableParent._tokenURI(uint256) (contracts/ERC721BridgeableParent.sol#112-111) compares to a boolean constant:
- _setTokenURI((uri) (data contract/ERC721BridgeableParent.sol#135))
References: https://github.com/crytic/slither/wiki/Detector-Documentation#boolean-equality

Different Versions of Solidity is used:
  - Version used: "0.8.0", "+0.8.1"
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#4)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#14)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#15)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#16)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#17)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#18)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#19)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#20)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#21)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#22)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#23)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#24)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#25)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#26)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#27)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#28)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#29)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#30)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#31)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#32)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#33)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#34)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#35)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#36)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#37)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#38)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#39)
  - "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#40)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#different-pragma-directive-are-used

AccessControl._setRoleAdmin(bytes2,bytes2) (node_modules/Openzeppelin/contracts/access/AccessControl.sol#20-210) is never used and should be removed
Address.functionCall(address,bytes) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#85-87) is never used and should be removed
Address.functionCall(addresses,bytes,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#99-101) is never used and should be removed
Address.functionCallWithValue(address,bytes,int256,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#120-122) is never used and should be removed
Address.functionDelegateCall(address,bytes) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#147-149) is never used and should be removed
Address.functionStaticCall(address,bytes,int256,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#157-160) is never used and should be removed
Address.functionStaticCall(address,bytes,int256,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#157-161) is never used and should be removed
Address.functionStaticCallWithValue(address,bytes,int256,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#201-221) is never used and should be removed
Address.functionStaticCallWithValue(address,bytes,int256,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#201-221) is never used and should be removed
Context._mapData((key,value) (node_modules/Openzeppelin/Contracts/Context.sol#23)) is never used and should be removed
ERC721._safeMint((to) (node_modules/Openzeppelin/Contracts/Token/ERC721.sol#8))
  - (success,returnData) = token.safeMint(to) (node_modules/Openzeppelin/Contracts/Token/ERC721.sol#10)
Metadata._setTokenMetadata((tokenId,metadata) (node_modules/Openzeppelin/Contracts/Token/ERC721.sol#10))
  - (success,returnData) = token.setTokenMetadata(tokenId,metadata) (node_modules/Openzeppelin/Contracts/Token/ERC721.sol#10)
String.toHexString(uint256) (node_modules/Openzeppelin/Contracts/Utils/Strings.sol#40-41) is never used and should be removed
References: https://github.com/crytic/slither/wiki/Detector-Documentation#read-code

PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#4) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#14) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#15) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#16) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#17) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#18) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#19) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#20) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#21) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#22) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#23) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#24) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#25) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#26) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#27) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#28) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#29) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#30) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#31) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#32) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#33) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#34) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#35) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#36) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#37) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#38) allows old versions
PiratenVersion "0.8.0" (node_modules/Openzeppelin/contracts/access/AccessControl.sol#39) allows old versions
Low level call in Address.sendValue(address,uint256) (node_modules/Openzeppelin/contracts/utils/Address.sol#60-65):
  - (success) = recipient.call{value:(amount)} (node_modules/Openzeppelin/contracts/utils/Address.sol#68)
Low level call in Address.functionCall(addresses,bytes,int256,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#120-129):
  - (success,returnData) = target.functionCall(addresses,bytes,int256,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#137)
Low level call in Address.functionStaticCall(addresses,bytes,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#157-166):
  - (success,returnData) = target.functionStaticcall(addresses,bytes,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#164)
Low level call in Address.functionDelegateCall(addresses,bytes,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#154-159):
  - (success,returnData) = target.delegatecall(addresses,bytes,string) (node_modules/Openzeppelin/Contracts/Utils/Address.sol#161)
References: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Parameter ERC721.safeTransferFrom(address,address,uint256,bytes).data (node_modules/Openzeppelin/contracts/token/ERC721/ERC721.sol#179) is not in mixedCase
Variable ERC721BridgeableParent._tokenData (contract/ERC721BridgeableParent.sol#12) is not in mixedCase
References: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

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grantRole(bytes32,address) should be declared external;
- AccessControl.grantRole(bytes32,address) (node_modules/@openzeppelin/contracts/access/AccessControl.sol#142-144)
revokeRole(bytes32,address) (node_modules/@openzeppelin/contracts/access/AccessControl.sol#155-157)
renounceRole(bytes32,address) (node_modules/@openzeppelin/contracts/access/AccessControl.sol#173-177)
name() should be declared external;
- ERC721.name() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#179-181)
symbol() should be declared external;
- ERC721.symbol() (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#186-188)
approve(address,uint256) should be declared external;
- ERC721.approve(address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#112-112)
setApprovalForAll(address,bool) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#136-138)
transferFrom(address,address,uint256) should be declared external;
- ERC721.transferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#150-159)
safeTransferFrom(address,address,uint256) should be declared external;
- ERC721.safeTransferFrom(address,address,uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#166-170)
tokenOfOwnerByIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721.sol#152-155)
tokenIndex(uint256) should be declared external;
- ERC721Enumerable.tokenIndex(uint256) (node_modules/@openzeppelin/contracts/token/ERC721/ERC721Enumerable.sol#52-55)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#public-function-that-could-be-declared-external

RaffleMintV1.sol
Reentrancy in RaffleMintV1.claimRaffle(uint256) (contracts/RaffleMintV1.sol#293-368):
External calls:
- (msg.sender).call(value: refundValue) (contracts/RaffleMintV1.sol#354)
State variables written after the call(s):
- proceedsPerAddress[msgSender()] -- refundValue (contracts/RaffleMintV1.sol#357)
Reentrancy in RaffleMintV1.rescue() (contracts/RaffleMintV1.sol#623-641):
External calls:
- (msg.sender).call(value: refundValue) (contracts/RaffleMintV1.sol#633)
State variables written after the call(s):
- (sent) = address(msgSender()).call(value: refundValue) (contracts/RaffleMintV1.sol#637)
Reentrancy in RaffleMintV1.withdrawAndRaffleProceeds() (contracts/RaffleMintV1.sol#512-530):
External calls:
- (msg.sender).call(value: proceeds) (contracts/RaffleMintV1.sol#522)
State variable written after the call(s):
- nonRaffleWithdrawableProceeds = 0 (contracts/RaffleMintV1.sol#526)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#reentrancy-vulnerabilities

RaffleMintV1.withdrawAnd... (contracts/RaffleMintV1.sol#644-652) ignores return value by LINK_TOKEN.transfer(_msgSender()),LINK_TOKEN.balanceOf(address(this)) (contracts/RaffleMintV1.sol#651)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#reentrancy-vulnerabilities

VRConsumerBase.requestRandomness(bytes32,uint256) (node_modules/@chainlink/contracts/src/v0.8/VRConsumerBase.sol#152-166) ignores return value by LINK.transferAndCall(vrfCoordinator,fee,abi.encode(keyHash,USER_SEED_PLACEHOLDER)) (node modules/@chainlink/contracts/src/v0.8/VRConsumerBase.sol#152-166)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#reentrancy-vulnerabilities

RaffleMintV1.pausePaused(bool) (paused (contracts/RaffleMintV1.sol#155)) shadowed:
- Pausable.pause() (node_modules/@openzeppelin/Contracts/security/Pausable.sol#28) (state variable)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#local-variable-shadowing

RaffleMintV1.updateReferralStartTime(uint256) (contract/RaffleMintV1.sol#480-594) should emit an event for:
- referralStartTime = time (contract/RaffleMintV1.sol#159)
RaffleMintV1.referralStartTime(uint256) (contract/RaffleMintV1.sol#480-594) should emit an event for:
- referralStartTime = time (contract/RaffleMintV1.sol#480)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#missing-events-arithmetic

RaffleMintV1._mintNFT(address,uint256) (contract/RaffleMintV1.sol#1715-1721) has external calls inside a loop: NFT_CONTRACT.mint(to,tokeId) (contracts/RaffleMintV1.sol#1720)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#calls-inside-a-loop

Reentrancy in RaffleMintV1.enterPremint(uint256) (contracts/RaffleMintV1.sol#209-251):
External calls:
- directMintAndIncrementCurrentTokenId(amount) (contracts/RaffleMintV1.sol#247)
- (msg.sender).call(value: amount) (contracts/RaffleMintV1.sol#249)
State variable written after the call(s):
- premintCounts += amount (contracts/RaffleMintV1.sol#250)
Reentrancy in RaffleMintV1.requestRandomness(bytes32,uint256) (node_modules/@chainlink/contracts/src/v0.8/VRConsumerBase.sol#152-166):
External calls:
- LINK.transferAndCall(vrfCoordinator,fee,abi.encode(keyHash,USER_SEED_PLACEHOLDER)) (node_modules/@chainlink/contracts/src/v0.8/VRConsumerBase.sol#153)
State variable written after the call(s):
- nonRaffle[keyHash] = nonce1[keyHash] + 1 (node_modules/@chainlink/contracts/src/v0.8/VRConsumerBase.sol#164)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#reentrancy-vulnerabilities

Reentrancy in RaffleMintV1.claimRaffle(uint256) (contracts/RaffleMintV1.sol#293-368):
External calls:
- (msg.sender).call(value: refundValue) (contracts/RaffleMintV1.sol#354)
Event emitted after the call(s):
- RaffleClaimed[msgSender()].call(value: refundValue) (contracts/RaffleMintV1.sol#359)
Reentrancy in RaffleMintV1.rescue() (contracts/RaffleMintV1.sol#623-641):
External calls:
- (msg.sender).call(value: refundValue) (contracts/RaffleMintV1.sol#633)
Event emitted after the call(s):
- (sent) = address(msgSender()).call(value: refundValue) (contracts/RaffleMintV1.sol#637)
Reentrancy in RaffleMintV1.withdrawAndRaffleProceeds() (contracts/RaffleMintV1.sol#512-530):
External calls:
- (msg.sender).call(value: proceeds) (contracts/RaffleMintV1.sol#522)
Event emitted after the call(s):
- NonRaffleProceedsClaimed[msgSender()].proceeds (contracts/RaffleMintV1.sol#529)
Reentrancy in RaffleMintV1.withdrawAndRaffleProceeds() (contracts/RaffleMintV1.sol#480-599):
External calls:
- (msg.sender).call(value: proceeds) (contracts/RaffleMintV1.sol#504)
Event emitted after the call(s):
- (sent) = address(msgSender()).call(value: proceeds) (contracts/RaffleMintV1.sol#508)
Reentrancy in RaffleMintV1._mintNFT(address,uint256) (contract/RaffleMintV1.sol#1715-1721) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= RAFFLE_START_TIME,RAFFLE_NOT_STARTED): Raffle must begin after current block time (contracts/RaffleMintV1.sol#186-189)
RaffleMintV1._mintNFT(address,uint256,uint256,uint256,uint256,address) (contract/RaffleMintV1.sol#147-200) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= raffleStartTimestamp,RAFFLE_ACTIVE): Raffle has begun, present or is no longer active (contracts/RaffleMintV1.sol#118-221)
RaffleMintV1._enterRaffleClaim(uint256) (contracts/RaffleMintV1.sol#255-266)
- require(bool,string)(block.timestamp >= raffleEndTimestamp,RAFFLE_NOT_ACTIVE): Raffle has ended, present or is no longer active (contracts/RaffleMintV1.sol#265-268)
RaffleMintV1._enterRaffleClaim(uint256) (contracts/RaffleMintV1.sol#276-279)
Dangerous comparisons:
- require(bool,string)(block.timestamp >= raffleEndTimestamp,RAFFLE_ACTIVE): Raffle can not be claimed while raffle is active (contracts/RaffleMintV1.sol#299-302)
RaffleMintV1._enterRaffleClaim(uint256) (contracts/RaffleMintV1.sol#303-306) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= raffleEndTimestamp,RAFFLE_ACTIVE): Raffle can not be claimed until it has ended (contracts/RaffleMintV1.sol#377-380)
RaffleMintV1._enterRaffleClaim(uint256) (contracts/RaffleMintV1.sol#403-406) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= raffleEndTimestamp,RAFFLE_ACTIVE): Clearing entry can not be set until raffle has ended (contracts/RaffleMintV1.sol#442-445)
RaffleMintV1._enterRaffleClaim(uint256) (contracts/RaffleMintV1.sol#446-453) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= raffleEndTimestamp,RAFFLE_ACTIVE): Raffle must end before claiming raffle proceeds (contracts/RaffleMintV1.sol#482-485)
RaffleMintV1._updateRaffleTime(uint256) (contract/RaffleMintV1.sol#530-558) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= raffleStartTimestamp,PREMINT_ENDED): Can not add to premint list after raffle has begun (contracts/RaffleMintV1.sol#548-551)
RaffleMintV1._updateRaffleStartTimestamp(uint256) (contract/RaffleMintV1.sol#559-586) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= raffleStartTimestamp,RAFFLE_START_LOCKED): Can not change raffle start time, raffle has already begun (contracts/RaffleMintV1.sol#588-591)
RaffleMintV1._updateRaffleEndTimestamp(uint256) (contract/RaffleMintV1.sol#591-609) uses timestamp for comparisons
- require(bool,string)(block.timestamp >= raffleEndTimestamp,RAFFLE_IS_LOCKED): Can not change raffle end time, raffle has already ended (contracts/RaffleMintV1.sol#603-606)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#block-timestamp

RaffleMintV1.constructor(bytes32,address,uint256,uint256,uint256,address) (contracts/RaffleMintV1.sol#147-200) compares to a boolean constant:
- require(bool,string)(RHT_CONTRACT_SUPPORTSINTERFACE(type)(ERC721BridgeableParent).interfaceId == true, RHT_CONTRACT_NOT_BRIDGEABLE): RHT Contract is not a ERC721BridgeableParent (contracts/RaffleMintV1.sol#178-183)
RaffleMintV1._claimRaffle(uint256) (contract/RaffleMintV1.sol#193-360) compares to a boolean constant:
- require(bool,string)(RHT_CONTRACT_SUPPORTSINTERFACE(type)(ERC165).interfaceId == true, RHT_CONTRACT_ERROR): RHT Contract does not support IERC165 Interface (contracts/RaffleMintV1.sol#172-175)
RaffleMintV1._enterPremint(uint256) (contract/RaffleMintV1.sol#203-251) compares to a boolean constant:
- require(bool,string)(premineEnabled == true, PREMINT_DISABLED): Premint is disabled (contracts/RaffleMintV1.sol#225-228)
RaffleMintV1._enterPremint(uint256) (contract/RaffleMintV1.sol#226-251) compares to a boolean constant:
- require(bool,string)(premineEnabled == true, PREMINT_ACTIVE): Raffle is active (contracts/RaffleMintV1.sol#241-242)
RaffleMintV1._enterPremint(uint256) (contract/RaffleMintV1.sol#243-251) compares to a boolean constant:
- require(bool,string)(premineEnabled == false, PREMINT_DISABLED): Premint is disabled (contracts/RaffleMintV1.sol#274-277)
RaffleMintV1._claimRaffle(uint256) (contract/RaffleMintV1.sol#193-360) compares to a boolean constant:
- require(bool,string)(rescueEnabled == false, RESCUE_ENABLED): Can not mint or enter raffle in rescue mode (contracts/RaffleMintV1.sol#278-281)
RaffleMintV1._claimRaffle(uint256) (contract/RaffleMintV1.sol#193-360) compares to a boolean constant:
- require(bool,string)(raffleClaimed == false, RAFFILE_CLAIMED): Raffle has not been claimed (contracts/RaffleMintV1.sol#304)
RaffleMintV1._claimRaffle(uint256) (contract/RaffleMintV1.sol#193-360) compares to a boolean constant:
- require(bool,string)(raffleClaimed == true, RAFFILE_CLAIMED): Raffle has already been claimed (contracts/RaffleMintV1.sol#304)
RaffleMintV1._clearRaffle(uint256) (contract/RaffleMintV1.sol#197-429) compares to a boolean constant:
- require(bool,string)(raffleClaimed == false, RAFFILE_CLAIMED): Raffle has already been cleared (contracts/RaffleMintV1.sol#305)
RaffleMintV1._clearRaffle(uint256) (contract/RaffleMintV1.sol#197-429) compares to a boolean constant:
- require(bool,string)(raffleClaimed == true, RAFFILE_CLAIMED): Raffle has already been claimed (contracts/RaffleMintV1.sol#305)
RaffleMintV1._clearRaffle(uint256) (contract/RaffleMintV1.sol#197-429) compares to a boolean constant:
- require(bool,string)(clearingEntropy == true, ENTROPY_MISSING): No entropy to clear raffle, call setClearingEntropy first (contracts/RaffleMintV1.sol#307-309)
RaffleMintV1.setClearingEntropy() (contract/RaffleMintV1.sol#143-144) compares to a boolean constant:
- require(bool,string)(clearingEntropy == false, ENTROPY_ALREADY_SET): Setting clearing entropy already set (contracts/RaffleMintV1.sol#342-445)
RaffleMintV1._withdrawRaffleProceeds() (contract/RaffleMintV1.sol#480-505) compares to a boolean constant:
- require(bool,string)(sent == true, RAFFILE_PAYOUT_UNSUCCESSFUL): (contracts/RaffleMintV1.sol#505)
RaffleMintV1._withdrawRaffleProceeds() (contract/RaffleMintV1.sol#512-530) compares to a boolean constant:
- require(bool,string)(sent == true, NONRAFFILE_PAYOUT_UNSUCCESSFUL): (contracts/RaffleMintV1.sol#532)
RaffleMintV1._withdrawRaffleProceeds() (contract/RaffleMintV1.sol#531-546) compares to a boolean constant:
- require(bool,string)(greenhandEnabled == false, PREMINT_ENABLED): Can not add to premint list while premint is active (contracts/RaffleMintV1.sol#543-546)
RaffleMintV1.setPaused(bool) (contracts/RaffleMintV1.sol#563-566) compares to a boolean constant:
- require(bool,string)(paused == true, PAUSED_NOT_PAUSED): (contracts/RaffleMintV1.sol#564)
RaffleMintV1.rescue() (contract/RaffleMintV1.sol#623-641) compares to a boolean constant:
- require(bool,string)(rescueEnabled == true, RESCUE_NOT_ENABLED): (contracts/RaffleMintV1.sol#624)
RaffleMintV1.rescue() (contract/RaffleMintV1.sol#623-641) compares to a boolean constant:
- require(bool,string)(rescueEnabled == true, RESCUE_ENABLED): (contracts/RaffleMintV1.sol#624)
Reference: https://github.com/crytic/slither/wikidoc-detectorDocumentation#bool-equality

```

Randomizer.sol

```

Reentrancy in Randomizer.fullRandWords(uint256,uint256) (contracts/Randomizer.sol#123-134):
    External calls:
        - randomWordsCallback(requestId,randomWords) (contracts/Randomizer.sol#131)
    State variable written after the call():
        - delete callback(requestId) (contracts/Randomizer.sol#132)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in Randomizer.requestRandWords(RandomizeCallback, uint32) (contracts/Randomizer.sol#49-90):
    External calls:
        - requestID = COORDINATOR.requestRandWords(keyHash,subscriptionId,requestConfirmations,callbackGasLimit,numWords) (contracts/Randomizer.sol#80-86)
    State variable written after the call():
        - callback(requestId) (contracts/Randomizer.sol#87)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-2

Contract: _preheat() (node_modules/opensppelin/contracts/utils/ReentrancyGuard.sol#4-5)
    - randomWordsCallback(requestId,randomWords) (contracts/Randomizer.sol#131)
    State variable written after the call():
        - delete callback(requestId) (contracts/Randomizer.sol#132)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3

Contract: _requestRandWords() (node_modules/opensppelin/contracts/interfaces/IERC165.sol#4-5)
    - transferOwnership(address) (node_modules/opensppelin/contracts/access/Ownable.sol#62-65)
    - Ownable.transferOwnership(address) (node_modules/opensppelin/contracts/access/Ownable.sol#62-65)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

renounceOwnership() should be declared external
transferOwnership(address) should be declared external
- Ownable.transferOwnership(address) (node_modules/opensppelin/contracts/access/Ownable.sol#62-65)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

StakingSystem.sol

```

StakingSystem._claimGameItemStateRewards(StakingSystem, GameItemState) (Contracts/StakingSystem.sol#621-654) performs a multiplication on the result of a division:
    - _goldReward = stakeBalance * goldPerShare (contracts/StakingSystem.sol#621)
    - _goldReward = stakeBalance * goldPerShare (contracts/StakingSystem.sol#625)
    - _goldReward = stakeBalance * goldPerShare (Contracts/StakingSystem.sol#801-816) performs a multiplication on the result of a division:
        - _goldReward = numShares * (goldPerShare - previousBalance) (Contracts/StakingSystem.sol#801-816)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#arithmetic-overflow-and-underflow

Reentrancy in StakingSystem._claimNFTStakeRewards(address,uint256,bool) (contracts/StakingSystem.sol#656-733):
    External calls:
        - IraffleConsumer(inftContract).incrementTrait(nftTokenId, TraitsLibrary.NFT_TRAIT_ID,goldPerTrait) (contracts/StakingSystem.sol#689-693)
        - requestID = _requestNFTStakeRewards() (Contracts/StakingSystem.sol#689)
        - _goldReward = stakeBalance * goldPerShare (Contracts/StakingSystem.sol#693)
        - _lockningSystem().removeNFTReservation(inftContract,nftTokenId,nftStake.reservationId) (Contracts/StakingSystem.sol#705-712)
    State variable written after the call():
        - _goldReward = stakeBalance * goldPerShare (Contracts/StakingSystem.sol#713)
        - _lockningSystem().removeNFTReservation(inftContract,nftTokenId,nftStake.reservationId) (Contracts/StakingSystem.sol#705-712)
        - _lockningSystem().removeNFTReservation(inftContract,nftTokenId,nftStake.reservationId) (Contracts/StakingSystem.sol#705-712)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-operations-of-solidity

Variable Randomizer.COORDINATOR (contracts/Randomizer.sol#424) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

Randomizer.slitherConstructorVariables() (contracts/Randomizer.sol#117-135) uses literals with too many digits:
    - callbackGasLimit = 1000000 (Contracts/Randomizer.sol#53)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#too-many-digits

Randomizer.callbackGasLimit (Contracts/Randomizer.sol#35) should be constant
Randomizer.requestConfirmations (Contracts/Randomizer.sol#39) should be constant
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variables-that-could-be-declared-constant

renounceOwnership() should be declared external
transferOwnership(address) (node_modules/opensppelin/contracts/access/Ownable.sol#62-65)
- Ownable.transferOwnership(address) (node_modules/opensppelin/contracts/access/Ownable.sol#62-65)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

Reentrancy in StakingSystem._claimNFTStakeRewards(address,uint256,bool) (Contracts/StakingSystem.sol#656-733):
    External calls:
        - IraffleConsumer(inftContract).incrementTrait(nftTokenId, TraitsLibrary.NFT_TRAIT_ID,goldPerTrait) (Contracts/StakingSystem.sol#689-693)
        - requestID = _requestNFTStakeRewards() (Contracts/StakingSystem.sol#689)
        - _goldReward = stakeBalance * goldPerShare (Contracts/StakingSystem.sol#693)
        - _lockningSystem().removeNFTReservation(inftContract,nftTokenId,nftStake.reservationId) (Contracts/StakingSystem.sol#705-712)
    State variable written after the call():
        - _goldReward = stakeBalance * goldPerShare (Contracts/StakingSystem.sol#713)
        - _lockningSystem().removeNFTReservation(inftContract,nftTokenId,nftStake.reservationId) (Contracts/StakingSystem.sol#705-712)
        - _lockningSystem().removeNFTReservation(inftContract,nftTokenId,nftStake.reservationId) (Contracts/StakingSystem.sol#705-712)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#arithmetic-overflow-and-underflow

Reentrancy in StakingSystem._claimNFTStakeRewards(address,uint256,uint256,bool) (Contracts/StakingSystem.sol#656-733):
    External calls:
        - _claimGameItemStateRewards(stakeIndex,junkIndex) (Contracts/StakingSystem.sol#447-450)
        - _lockningSystem().removeNFTReservation(account,address(gameItems),stakeTokenId,stake.reservationId) (Contracts/StakingSystem.sol#781-786)
    State variable written after the call():
        - _lockningSystem().removeNFTReservation(account,address(gameItems),stakeTokenId,stake.reservationId) (Contracts/StakingSystem.sol#781-786)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#arithmetic-overflow-and-underflow

Reentrancy in StakingSystem._claimNFTStakeRewards(address,uint256,uint256):
    External calls:
        - _claimGameItemStateRewards(stakeIndex,junkIndex) (Contracts/StakingSystem.sol#447)
        - _lockningSystem().removeNFTReservation(account,address(gameItems),stakeTokenId,stake.reservationId) (Contracts/StakingSystem.sol#781-786)
    State variable written after the call():
        - _lockningSystem().removeNFTReservation(account,address(gameItems),stakeTokenId,stake.reservationId) (Contracts/StakingSystem.sol#781-786)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#arithmetic-overflow-and-underflow

External calls:
    - _claimGameItemStateRewards(stakeIndex,junkIndex) (Contracts/StakingSystem.sol#447)
    - _lockningSystem().removeNFTReservation(account,address(gameItems),stakeTokenId,stake.reservationId) (Contracts/StakingSystem.sol#781-786)
    State variable written after the call():
        - _lockningSystem().removeNFTReservation(account,address(gameItems),stakeTokenId,stake.reservationId) (Contracts/StakingSystem.sol#781-786)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#arithmetic-overflow-and-underflow

Reentrancy in StakingSystem.statePirate(address,addres,uint256,uint32[],uint256[]):
    External calls:
        - stake = GameItemTake((tokenId,balance,uint50(block.timestamp),lockingSystem.address(pameItems),tokenId,balance,true,0)) (Contracts/StakingSystem.sol#343-355)
        - stakingSystem.lockNFT(inftContract,nftTokenId) (Contracts/StakingSystem.sol#346)
        - nftStake.reservationId = lockingSystem.addNFTReservation(inftContract,nftTokenId,true,0) (Contracts/StakingSystem.sol#372-377)
    State variables written after the call():
        - nftStake.reservationId = lockingSystem.addNFTReservation(inftContract,nftTokenId,true,0) (Contracts/StakingSystem.sol#372-377)
    Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

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AUTOMATED TESTING

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StakingSystem.stateNavy(address,uint32[])(contracts/StakingSystem.sol#209-269) uses tx.origin for authorization: require(bool,string)(tx.origin == _msgSender() || _hasAccessRole(GameRegistryLibrary.GAME_LOGIC_CONTRACT_ROLE,_msgSender()),USER_OR_GAME_LOGIC_CALLER_ONLY: Only User or Game Logic can call this function)(contracts/StakingSystem.sol#214-221)
StakingSystem.stateNavy(address,uint32[])(contracts/StakingSystem.sol#209-269) uses tx.origin for authorization: require(bool,string)(account == tx.origin,ACCOUNT_MUST_MATCH_ORIGIN: Account must match transaction origin)(contracts/StakingSystem.sol#212-223)
StakingSystem.statePlrct(address,address,uint256,uint32[])(contracts/StakingSystem.sol#230-381) uses tx.origin for authorization: require(bool,string)(tx.origin == _msgSender() || _hasAccessRole(GameRegistryLibrary.GAME_LOGIC_CONTRACT_ROLE,_msgSender()),USER_OR_GAME_LOGIC_CALLER_ONLY: Only User or Game Logic can call this function)(contracts/StakingSystem.sol#292-299)
StakingSystem.claimNavy(address,uint32[],uint32[])(contracts/StakingSystem.sol#209-304) uses tx.origin for authorization: require(bool,string)(tx.origin == _msgSender() || _hasAccessRole(GameRegistryLibrary.GAME_LOGIC_CONTRACT_ROLE,_msgSender()),USER_OR_GAME_LOGIC_CALLER_ONLY: Only User or Game Logic can call this function)(contracts/StakingSystem.sol#292-299)
StakingSystem.claimNavy(address,uint32[])(contracts/StakingSystem.sol#190-417) uses tx.origin for authorization: require(bool,string)(tx.origin == _msgSender(),USER_CALLER_ONLY: Only EOA can call this function)(contracts/StakingSystem.sol#191-433)
StakingSystem.claimNavy(address,uint32[])(contracts/StakingSystem.sol#425-479) uses tx.origin for authorization: require(bool,string)(tx.origin == account,USER_CALLER_ONLY: Only EOAs can claim for their own account)(contracts/StakingSystem.sol#430-433)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#dangerous-use-of-txorigin

StakingSystem.stateNavy(bool)(paused)(contracts/StakingSystem.sol#187) shadows:
    - tx.origin(address,uint32)(state variable)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#local-variable-shadowing

StakingSystem.stateNavy(address,uint32[],uint32[])(contracts/StakingSystem.sol#209-269) has external calls inside a loop: stake = GameItemStake(tokenId,balance,uint8(totalTaxInGoldPerRank),lockingSystem.addItemReservation[_msgSender()],address,(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#246-259)
StakingSystem.statePlrct(address,address,uint256,uint32[],uint32[])(contracts/StakingSystem.sol#230-381) has external calls inside a loop: stake = GameItemStake(tokenId,balance,uint8(block.timestamp),lockingSystem.addItemReservation[_msgSender()],address,(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#292-304)
StakingSystem.claimNavy(address,uint32[],uint32[])(contracts/StakingSystem.sol#209-304) has external calls inside a loop: require(bool,string)(IGameNFT(nftContract).ownerOf(uintTokenId) == relevantAccount,ORIGIN_NOT_OWNER_OF_NFT: Origin is not the owner of the specified NFT)(contracts/StakingSystem.sol#163-666)
StakingSystem.claimNavy(address,uint32[])(contracts/StakingSystem.sol#190-417) has external calls inside a loop: goldFiferShip = (block.timestamp - stake.value) * ITraitsConsumer(address(gameItems))
StakingSystem.claimNavy(address,uint32[])(contracts/StakingSystem.sol#425-479) has external calls inside a loop: goldFiferShip = (block.timestamp - stake.value) * ITraitsConsumer(address(gameItems))
StakingSystem.calculateGameItemTakeRewards(StakingSystem.GamemItemTakeRewards)(contracts/StakingSystem.sol#621-654) has external calls inside a loop: maxCapacity = ITraitsConsumer(address(gameItems)).getTraitUnit256(stake.tokenId,TraitsLibrary.SHIFT_TRAIT_ID)(contracts/StakingSystem.sol#621-636)
GameHelperLibrary.isPlrctShard(IGameItemTakeRewards)(contracts/GameHelperLibrary.sol#49-103) has external calls inside a loop: ITraitsConsumer(address(gameItems)).getTraitUnit256(stake.tokenId,TraitsLibrary.IS_NAVY_TRAIT_ID) == false || ITrafficLibrary.isNavyTrait(stake.tokenId,TraitsLibrary.IS_NAVY_TRAIT_ID) != 1 (contracts/libraries/GameHelperLibrary.sol#49-103)
GameRegistryConsumer.lockingSystem() (contracts/GameRegistryConsumer.sol#80-93) has external calls inside a loop: _gasFeeRegistry.getLockingSystem() (contracts/GameRegistryConsumer.sol#81)
StakingSystem.claimNameNFTStateRewards(StakingSystem.GamemItemTakeRewards)(contracts/StakingSystem.sol#656-730) has external calls inside a loop: ITraitsConsumer(nftContract).incrementTrait(stake.tokenId,TraitsLibrary.XP_TRAIT_ID,xpOwned) (contracts/StakingSystem.sol#656-692)
GamemItemTakeRewards.requestRandomWords(uint32)(contracts/GamemItemTakeRewards.sol#91-97) has external calls inside a loop: _gameRegistry.getRandomizer().requestRandomWords(IRandomizerCallback(this),numWords) (contracts/GameRegistryConsumer.sol#693-696)
StakingSystem.claimNameNFTStateRewards(address,uint256,bool)(contracts/StakingSystem.sol#656-730) has external calls inside a loop: goldToken.mint(relevantAccount,goldDeed) (contracts/StakingSystem.sol#722)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#call-site-inside-a-loop

Reentrancy in StakingSystem.claimNameNFTStateRewards(address,uint256,bool)(contracts/StakingSystem.sol#656-730):
    External calls:
        - ITraitsConsumer(nftContract).incrementTrait(stake.tokenId,TraitsLibrary.XP_TRAIT_ID,xpOwned) (contracts/StakingSystem.sol#656-693)
        - _gameRegistry.requestRandomWords(IRandomizerCallback(this),numWords) (contracts/GameRegistryConsumer.sol#92-96)
        State Variables written after the calls():
        - numWords = writeValue((IRandomizerCallback(this).numWords) / balance) (contracts/StakingSystem.sol#656-708)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem.stateNavy(address,uint32[],uint32[])(contracts/StakingSystem.sol#209-269):
    External calls:
        - nftContract.reserveItemStake(tokenId,balance,uint8(totalTaxInGoldPerRank),lockingSystem.addItemReservation[_msgSender()],address(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#246-259)
    State Variable written after the calls():
        - numTokensStaked = writeValue((nftContract.reserveItemStake(tokenId, balance, tokenId, 0) / balance)) (contracts/StakingSystem.sol#246-263)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem._claimGameItemStateRewards(StakingSystem.GamemItemTakeRewards)(contracts/StakingSystem.sol#743-756):
    External calls:
        - _lockingSystem().removeItemReservation(account,address(gameItems),stake.tokenId,stake.reservationId) (contracts/StakingSystem.sol#743-756)
    Event emitted after the calls():
        - stakingEvent(stake.tokenId,stake.balance) (contracts/StakingSystem.sol#749)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem.claimNameNFTStateRewards(address,uint256,bool)(contracts/StakingSystem.sol#656-730):
    External calls:
        - ITraitsConsumer(nftContract).incrementTrait(stake.tokenId,TraitsLibrary.XP_TRAIT_ID,xpOwned) (contracts/StakingSystem.sol#656-693)
        - _gameRegistry.requestRandomWords(IRandomizerCallback(this),numWords) (contracts/GameRegistryConsumer.sol#92-96)
        - _lockingSystem().removeItemReservation(nftContract,stake.tokenId,nftTokenId,reservationId) (contracts/StakingSystem.sol#658-708)
    Event emitted after the calls():
        - NFTUnstaked(relevantAccount,nftContract,stake.tokenId) (contracts/StakingSystem.sol#178-181)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem._claimNameNFTStateRewards(StakingSystem.GamemItemTakeRewards)(contracts/StakingSystem.sol#743-756):
    External calls:
        - _lockingSystem().removeItemReservation(account,address(gameItems),stake.tokenId,stake.reservationId) (contracts/StakingSystem.sol#743-756)
    Event emitted after the calls():
        - stakingEvent(stake.tokenId,stake.balance) (contracts/StakingSystem.sol#749)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem.stateNavy(address,uint32[],uint32[])(contracts/StakingSystem.sol#209-269):
    External calls:
        - ITraitsConsumer(nftContract).incrementTrait(stake.tokenId,TraitsLibrary.XP_TRAIT_ID,xpOwned) (contracts/StakingSystem.sol#656-693)
        - goldToken.mint(relevantAccount,goldDeed) (contracts/StakingSystem.sol#722)
        - NFTUnstaked(relevantAccount,nftContract,stake.tokenId,goldDeed) (contracts/StakingSystem.sol#725-731)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1
    Event emitted after the calls():
        - goldToken.mint(account,goldDeed) (contracts/StakingSystem.sol#832)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem.claimNameNFTStateRewards(address,uint256,bool)(contracts/StakingSystem.sol#656-730):
    External calls:
        - ITraitsConsumer(nftContract).incrementTrait(stake.tokenId,TraitsLibrary.XP_TRAIT_ID,xpOwned) (contracts/StakingSystem.sol#656-693)
        - goldToken.mint(stake.tokenId,relevantAccount,goldDeed) (contracts/StakingSystem.sol#722)
        - NFTUnstaked(relevantAccount,nftContract,stake.tokenId,goldDeed) (contracts/StakingSystem.sol#725-731)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1
    Event emitted after the calls():
        - goldToken.mint(account,goldDeed) (contracts/StakingSystem.sol#832)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem.stateNavy(address,uint32[],uint32[])(contracts/StakingSystem.sol#209-269):
    External calls:
        - stake = GameItemStake(tokenId,balance,uint8(totalTaxInGoldPerRank),lockingSystem.addItemReservation[_msgSender()],address(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#246-259)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1
    Event emitted after the calls():
        - nftContract.reserveItemStake(tokenId,balance,uint8(totalTaxInGoldPerRank),lockingSystem.addItemReservation[_msgSender()],address(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#246-263)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

Reentrancy in StakingSystem.statePlrct(address,address,uint256,uint32[],uint32[])(contracts/StakingSystem.sol#230-381):
    External calls:
        - nftContract.reserveItemStake(tokenId,balance,uint8(totalTaxInGoldPerRank),lockingSystem.addItemReservation[_msgSender()],address(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#280-301)
        - stake = GameItemStake(tokenId,balance,uint8(block.timestamp),lockingSystem.addItemReservation[_msgSender()],address(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#343-355)
    Event emitted after the calls():
        - totalTaxInGoldPerRank = writeValue((totalTaxInGoldPerRank + stake.balance) * (block.timestamp)) (contracts/StakingSystem.sol#193)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-1

StakingSystem.calculateGameItemTakeRewards(StakingSystem.GamemItemTakeRewards)(contracts/StakingSystem.sol#621-654) uses timestamp for comparisons
    Dangerous comparison(s):
        - goldFiferShip > maxCapacity (contracts/StakingSystem.sol#638)
    StakingSystem.claimNameNFTStateRewards(StakingSystem.GamemItemTakeRewards)(contracts/StakingSystem.sol#743-756) uses timestamp for comparisons
        - require(bool,string)(! unstake || (block.timestamp - stake.value) > MIN_HOURS_TO_UNSTAKE),STATE_NOT_COMPLETE: Must be staked for minimum time before unstaking (contracts/StakingSystem.sol#756-760)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#block-timestamp

StakingSystem.statePlrct(address,address,uint256,uint32[],uint32[])(contracts/StakingSystem.sol#230-381) compares to a boolean constant:
    lockingSystem.addItemReservation(nftContract,stake.tokenId,stake.reservationId) (contracts/StakingSystem.sol#292-299)
StakingSystem.statePlrct(address,address,uint256,uint32[],uint32[])(contracts/StakingSystem.sol#230-381) compares to a boolean constant:
    - nftContract.reserveItemStake(tokenId,balance,uint8(totalTaxInGoldPerRank),lockingSystem.addItemReservation[_msgSender()],address(gameItems),tokenId,balance,true,0)) (contracts/StakingSystem.sol#280-301)
    - require(bool,string)(isPlrctShard(IGameItemTakeRewards,nftTokenId) == true,NFT_NOT_PIRATE: NFT is not a pirate NFT)(contracts/StakingSystem.sol#287-296)
GameHelperLibrary.isPlrctShard(IGameItemTakeRewards,nftTokenId)(contracts/libraries/GameHelperLibrary.sol#47-48) compares to a boolean constant:
    - require(bool,string)(isPlrctShard(IGameItemTakeRewards,nftTokenId) == true,NFT_NOT_PIRATE: NFT is not a pirate NFT)(contracts/libraries/GameHelperLibrary.sol#47-48)
    - ! (contracts/libraries/GameHelperLibrary.sol#47-48)
GameHelperLibrary.isNavyTrait(stake.tokenId,TraitsLibrary.IS_NAVY_TRAIT_ID)(contracts/libraries/GameHelperLibrary.sol#47-48) compares to a boolean constant:
    - require(bool,string)(isNavyTrait(TraitsLibrary.IS_NAVY_TRAIT_ID) == true,ITraitsConsumer(address(gameItems)).getTraitUnit256(tokenId,TraitsLibrary.IS_NAVY_TRAIT_ID) == 1)(contracts/libraries/GameHelperLibrary.sol#47-48)
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#boolean-equality

StakingSystem.stateNavy(address,uint32[],uint32[])(contracts/StakingSystem.sol#209-269) has costly operations inside a loop:
    - totalNavyRankStaked = (balance * rankForNavy(gameItems,tokenId)) / balance (contracts/StakingSystem.sol#246-263)
StakingSystem.payNavyTax(uint256)(contracts/StakingSystem.sol#53-563) has costly operations inside a loop:
    - totalNavyRankStaked = (amount * unaccountedNavyRewards) / totalNavyRankStaked (contracts/StakingSystem.sol#561-563)
StakingSystem.claimNameNFTStateRewards(StakingSystem.GamemItemTakeRewards)(contracts/StakingSystem.sol#743-756) has costly operations inside a loop:
    - totalNavyRankStaked = rank (contracts/StakingSystem.sol#747)
    Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#costly-operations-inside-a-loop

Contract: $openzeppelin/module/openzeppelin-solidity/contracts/math/Math.sol#23 is never used and should be removed
GameHelperLibrary._xpForFirstStake(address,uint32)(contracts/libraries/GameHelperLibrary.sol#112-123) is never used and should be removed
GameRegistryConsumer._isGameRegistrySett()(contracts/GameRegistryConsumer.sol#51-53) is never used and should be removed
SafeCast.toInt256(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#108-119) is never used and should be removed
SafeCast.toInt256(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#120-131) is never used and should be removed
SafeCast.toInt256(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#224-227) is never used and should be removed
SafeCast.toInt128(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#47-50) is never used and should be removed
SafeCast.toInt128(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#51-54) is never used and should be removed
SafeCast.toInt128(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#134-137) is never used and should be removed
SafeCast.toInt128(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#177-180) is never used and should be removed
SafeCast.toInt128(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#122-125) is never used and should be removed
SafeCast.toInt128(int256)(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#162-165) is never used and should be removed
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#unnecessary-code

Pragma version: 0.8.0 (node_modules/@openzeppelin/contracts/access/Ownable.sol#4) allows old versions
Pragma version: 0.8.0 (node_modules/@openzeppelin/contracts/security/Pausable.sol#4) allows old versions
Pragma version: 0.8.0 (node_modules/@openzeppelin/contracts/security/ReentrancyGuard.sol#4) allows old versions
Pragma version: 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC115/IERC115.sol#4) allows old versions
Pragma version: 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721.sol#4) allows old versions
Pragma version: 0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Enumerable.sol#4) allows old versions
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#unnecessary-code

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TraitsProvider.sol

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pragma version="0.8.0" (node_modules/@openzeppelin/contracts/utils/Context.sol#4) allows old versions
pragma version="0.8.0" (node_modules/@openzeppelin/contracts/utils/introspection/IERC165.sol#4) allows old versions
pragma version="0.8.0" (node_modules/@openzeppelin/contracts/math/SafeCast.sol#4) allows old versions
pragma version="0.8.0" (contract@/interfaces/IStakingSystem.sol#19) allows old versions
pragma version="0.8.0" (contract@/interfaces/IERC1155Lockable.sol#8) allows old versions
pragma version="0.8.0" (contract@/interfaces/IERC721Lockable.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/IERC721.sol#1) allows old versions
pragma version="0.8.0" (contract@/interfaces/INameNTX.sol#19) allows old versions
pragma version="0.8.0" (contract@/interfaces/ILockingSystem.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/IPixelName.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/IRandomizeCallback.sol#8) allows old versions
pragma version="0.8.0" (contract@/interfaces/ITakingSystem.sol#3) allows old versions
pragma version="0.8.0" (contract@/libraries/GameHelperLibrary.sol#8) allows old versions
pragma version="0.8.0" (contract@/libraries/GameRegistryLibrary.sol#3) allows old versions
pragma version="0.8.0" (contract@/libraries/UtilLibrary.sol#1) allows old versions
reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Parameter StakingSystem.setContracts(address, address) _gasLimit (contract@/StakingSystem.sol#16) is not in mixedCase
Parameter StakingSystem.setContracts(address, address) _oldIndex (contract@/StakingSystem.sol#16) is not in mixedCase
Parameter StakingSystem.setPaused(bool) _paused (contract@/StakingSystem.sol#19) is not in mixedCase
Variable StakingSystem.MAX_PER_COMMAND (contract@/StakingSystem.sol#46) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

renounceOwnership() should be declared external;
- Ownable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Ownable.sol#4-6)
transferOwnership(address) should be declared external;
- Ownable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Ownable.sol#4-6)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

TraitsConsumer.sol

```

UtilityLibrary.based(bytes) (contract@/libraries/UtilLibrary.sol#11-12) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_base64, 0 - 1,0x3d << 240) (contract@/libraries/UtilLibrary.sol#77)
UtilityLibrary.based(bytes) (contract@/libraries/UtilLibrary.sol#11-12) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_base64, 0 - 1,0x3d << 249) (contract@/libraries/UtilLibrary.sol#77)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#shift-parameter-mixup

TraitConsumer.defaultImageURI (contract@/TraitConsumer.sol#35) is never initialized. It is used in:
- TraitConsumer.imageURI(uint256) (contract@/TraitConsumer.sol#26-27)
TraitConsumer.description (contract@/TraitConsumer.sol#35) is never initialized. It is used in:
- TraitConsumer.tokenDescription(uint256) (contract@/TraitConsumer.sol#21-22)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#uninitialized-state-variables

UtilLibrary.based(bytes) (contract@/libraries/UtilLibrary.sol#11-12) performs a multiplication on the result of a division:
- _encodesLen = 4 * (data.length + 2 / 3) (contract@/libraries/UtilLibrary.sol#18)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#divide-before-multiply

UtilLibrary.based(bytes) (contract@/libraries/UtilLibrary.sol#11-12) uses assembly
- INLINENASM (contract@/libraries/UtilLibrary.sol#2-79)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage

TraitConsumer.tokenURI(uint256) (contract@/TraitConsumer.sol#11-20) compares to a boolean constant:
- _hasTrait(tokenId,TraitConsumer.NAME_TRAIT_ID) == true (contract@/TraitConsumer.sol#20)
TraitConsumer.tokenDescription(uint256) (contract@/TraitConsumer.sol#11-22) compares to a boolean constant:
- _hasTrait(tokenId,TraitLibrary.DESCRIPTION_TRAIT_ID) == true (contract@/TraitConsumer.sol#21)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#constant-comparison

Context._eqData() (node_modules/@openzeppelin/contracts/utils/Context.sol#1-29) is never used and should be removed
GameRegistryConsumer._lockGameRegistrySet() (contract@/GameRegistryConsumer.sol#51-61) is never used and should be removed
GameRegistryConsumer._isGameRegistrySet() (contract@/GameRegistryConsumer.sol#51-53) is never used and should be removed
GameRegistryConsumer._lockingSystem() (contract@/GameRegistryConsumer.sol#80-82) is never used and should be removed
GameRegistryConsumer._name() (contract@/GameRegistryConsumer.sol#80-82) is never used and should be removed
SafeCast.toInt128(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#152-159) is never used and should be removed
SafeCast.toInt16(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#206-209) is never used and should be removed
SafeCast.toInt32(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#153-156) is never used and should be removed
SafeCast.toInt32(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#158-159) is never used and should be removed
SafeCast.toInt64(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#70-73) is never used and should be removed
SafeCast.toInt8(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#107-109) is never used and should be removed
SafeCast.toInt16(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#107-110) is never used and should be removed
SafeCast.toInt32(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#107-109) is never used and should be removed
SafeCast.toInt32(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#92-95) is never used and should be removed
SafeCast.toInt64(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#77-80) is never used and should be removed
SafeCast.toInt8(uint256) (node_modules/@openzeppelin/contracts/math/SafeCast.sol#77-79) is never used and should be removed
String.concat(string,uint256) (node_modules/@openzeppelin/contracts/utils/Strings.sol#40-51) is never used and should be removed
String.concat(string,uint256) (node_modules/@openzeppelin/contracts/utils/Strings.sol#56-66) is never used and should be removed
TraitConsumer._getTraitProperties() (contract@/TraitConsumer.sol#27-59) is never used and should be removed
TraitConsumer._getTraitProperties() (contract@/TraitConsumer.sol#11-16) is never used and should be removed
TraitConsumer._getTokenURI(uint256) (contract@/TraitConsumer.sol#11-25) is never used and should be removed
TraitConsumer._getTokenURI(uint256) (contract@/TraitConsumer.sol#42-45) is never used and should be removed
TraitConsumer._tokenURI(uint256) (contract@/TraitConsumer.sol#48-50) is never used and should be removed
TraitConsumer._tokenURI(uint256) (contract@/TraitConsumer.sol#11-13) is never used and should be removed
UtilLibrary.int2str(uint256) (contract@/libraries/UtilLibrary.sol#85-101) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#use-case

pragma version="0.8.0" (node_modules/@openzeppelin/contracts/access/Ownable.sol#4) allows old versions
pragma version="0.8.0" (node_modules/@openzeppelin/contracts/utils/String.sol#4) allows old versions
pragma version="0.8.0" (node_modules/@openzeppelin/contracts/utils/introspection/IERC165.sol#4) allows old versions
pragma version="0.8.0" (node_modules/@openzeppelin/contracts/math/SafeCast.sol#4) allows old versions
pragma version="0.8.0" (contract@/interfaces/ITraitConsumer.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/ITraitsProvider.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/ITakingSystem.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/ILockingSystem.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/IRandomizeCallback.sol#8) allows old versions
pragma version="0.8.0" (contract@/interfaces/ITraitProvider.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/ITraitReceiver.sol#3) allows old versions
pragma version="0.8.0" (contract@/interfaces/ITraitProvider.sol#13) is not in mixedCase
Variable TraitConsumer._uri (contract@/TraitConsumer.sol#25) is not in mixedCase
Variable TraitConsumer._baseImageURI (contract@/TraitConsumer.sol#12) is not in mixedCase
Variable TraitConsumer._baseTraitURI (contract@/TraitConsumer.sol#13) is not in mixedCase
Variable TraitConsumer._name (contract@/TraitConsumer.sol#13) is not in mixedCase
Variable TraitConsumer._defaultDescription (contract@/TraitConsumer.sol#33) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

TraitConsumer.defaultDescription (contract@/TraitConsumer.sol#33) should be constant
TraitConsumer.defaultImageURI (contract@/TraitConsumer.sol#13) should be constant
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#use-case-variables-that-could-be-declared-constant

renounceOwnership() should be declared external;
- Ownable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Ownable.sol#4-6)
transferOwnership(address) should be declared external;
- Ownable.transferOwnership(address) (node_modules/@openzeppelin/contracts/access/Ownable.sol#4-6)
supportsInterface(bytes4) (contract@/TraitConsumer.sol#49-50) (contract@/TraitConsumer.sol#49-50)
- TraitConsumer.supportsInterface(bytes4) (contract@/TraitConsumer.sol#49-50)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

StagedMintV1.sol

```
StageMintV1.withdrawProceeds() (contracts/StagedMintV1.sol#199-213) uses a dangerous strict equality:  
    - require(bool,string) NFT_CONTRACT.supportsInterface(type())(IERC165.interfaceId) == true,NFT_CONTRACT_ERROR: NFT Contract doesn't support IERC165 Interface) (contracts/StagedMintV1.sol#107-210)  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#dangerous-strict-equality  
  
StageMintV1.setPaused(bool)_paused (contracts/StagedMintV1.sol#241) shadow:  
    - Pausable.pause (node_modules/openzeppelin/contracts/security/Pausable.sol#28) (state variable)  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#local-variable-shadowing  
  
Reentrancy in StageMintV1.withdrawProceeds() (contracts/StagedMintV1.sol#199-213):  
    External calls:  
        - (emit) = address(_spender).call{value: balance} () (contracts/StagedMintV1.sol#206)  
        - (return value after the call):  
            - WithdrawProceeds(_spender),balance (contracts/StagedMintV1.sol#212)  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#reentrancy-vulnerabilities-3  
  
StageMintV1.constructor(uint256,uint256,uint256,address) (contracts/StagedMintV1.sol#77-111) compares to a boolean constant:  
    - require(bool,string) NFT_CONTRACT.supportsInterface(type())(IERC165.interfaceId) == true,NFT_CONTRACT_ERROR: NFT Contract doesn't support IERC165 Interface) (contracts/StagedMintV1.sol#107-100)  
    - require(bool,string) NFT_CONTRACT.supportsInterface(type())(IERC721BridgableParent.interfaceId) == true,NFT_CONTRACT_NOT_BRIDGABLE: NFT Contract is not a IERC721BridgableParent) (contracts/StagedMintV1.sol#103-108)  
StageMintV1.withdrawProceeds() (contracts/StagedMintV1.sol#199-213) compares to a boolean constant:  
    - require(bool,string) NFT_CONTRACT.supportsInterface(type())(IERC165.interfaceId) == true,NFT_CONTRACT_ERROR: NFT Contract doesn't support IERC165 Interface) (contracts/StagedMintV1.sol#107-210)  
StagedMintV1.setPaused(bool) (contracts/StagedMintV1.sol#241-244) compares to a boolean constant:  
    - paused == true (contracts/StagedMintV1.sol#242)  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#boolean-equality  
  
Different versions of Solidity are used:  
    - 0.6.0 (node modules/openzeppelin/contracts/access/Omnable.sol#1)  
    - 0.6.0 (node modules/openzeppelin/contracts/contract/Ownable.sol#4)  
    - 0.6.0 (node modules/openzeppelin/contracts/contract/Security.sol#1)  
    - 0.6.0 (node modules/openzeppelin/contracts/math/Math.sol#4)  
    - 0.6.0 (node modules/openzeppelin/contracts/token/ERC20/ERC20.sol#4)  
    - 0.6.0 (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#4)  
    - 0.6.0 (node modules/openzeppelin/contracts/token/ERC721/extension/IERC721Enumerable.sol#4)  
    - 0.6.0 (node modules/openzeppelin/contracts/utils/Context.sol#4)  
    - 0.6.0 (node modules/openzeppelin/contracts/utils/Counters.sol#4)  
    - 0.6.0 (node modules/openzeppelin/contracts/utils/Introspection/IERC165.sol#4)  
    - 0.6.1 (contracts/StagedMintV1.sol#2) necessitates a version too recent to be used. Consider deploying with 0.6.12/0.7.6/0.8.7  
    - 0.6.0 (contracts/interface/IERC721BridgableParent.sol#8) allows old versions  
solc-0.6.13 is not recommended for development  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#incorrect-versions-of-solidity  
  
Low level call in StagedMintV1.withdrawProceeds() (contracts/StagedMintV1.sol#199-213):  
    - (emit) = address(_spender).call{value: balance} () (contracts/StagedMintV1.sol#206)  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#low-level-calls  
  
Parameter StagedMintV1.setPaused(bool)_paused (contracts/StagedMintV1.sol#241) is not in mixedCase  
Parameter StagedMintV1.setInStage(StageMintV1.MintType)_stage (contracts/StagedMintV1.sol#251) is not in mixedCase  
Variable StageMintV1.HIRE_COST (contracts/StagedMintV1.sol#28) is not in mixedCase  
Variable StageMintV1.FREIGHT_COST (contracts/StagedMintV1.sol#30) is not in mixedCase  
Variable StageMintV1.POWER_SUPPLY_COST (contracts/StagedMintV1.sol#31) is not in mixedCase  
Variable StageMintV1.HAX_PUB_ADDRESS (contracts/StagedMintV1.sol#34) is not in mixedCase  
Variable StageMintV1.NFT_CONTRACT (contracts/StagedMintV1.sol#36) is not in mixedCase  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#commerce-to-solidity-naming-conventions  
  
renounceOwnership() should be declared external:  
    - Ownable.transferOwnership(address) (node modules/openzeppelin/contracts/access/Omnable.sol#6-6)  
transferOwnership(address) should be declared external:  
    - Ownable.transferOwnership(address) (node modules/openzeppelin/contracts/access/Omnable.sol#6-6)  
BalanceOf(address) should be declared external:  
    - ERC721.balanceOf(address) (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#62-65)  
name() should be declared external:  
    - ERC721.name() (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#61-65)  
symbol() should be declared external:  
    - ERC721.symbol() (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#64-68)  
tokenURI(uint256) should be declared external:  
    - ERC721.tokenURI(uint256) (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#63-68)  
approve(address,uint256) should be declared external:  
    - ERC721.approve(address,uint256) (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#112-112)  
setApprovalForAll(address,bool) should be declared external:  
    - ERC721.setApprovalForAll(address,bool) (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#136-138)  
transferFrom(address,address,uint256) should be declared external:  
    - ERC721.transferFrom(address,address,uint256) (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#150-159)  
safeTransferFrom(address,address,uint256) should be declared external:  
    - ERC721.safeTransferFrom(address,address,uint256) (node modules/openzeppelin/contracts/token/ERC721/ERC721.sol#166-170)  
Reference: https://github.com/crytic/solidity/wiki/Detector-Documentation#public-function-that-could-be-declared-external
```

LootSystem.sol

HoldingSystem.sol

```
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#4) allows old versions
Fragma version "0.8.2" (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts-upgradeable/math/MathUpgradeable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/token/ERC115/IERC115Upgradeable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Upgradeable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC721Enumerable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC721URIUpgradeable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/math/SafeCast.sol#4) allows old versions
Fragma version "0.8.0" (contracts/GameRegistryConsumerUpgradeable.sol#4) allows old versions
Fragma version "0.8.0" (contracts/interfaces/IERC115Lockable.sol#4) allows old versions
Fragma version "0.8.0" (contracts/interfaces/IERC721Lockable.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IGameNFT.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IGameRegistry.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/interfaces/ILockingSystem.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IMathUpgradeable.sol#4) allows old versions too recent to be trusted. Consider deploying with 0.6.12/0.7.6/0.8.7
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IReentrancyGuard.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/interfaces/IReentrancyGuardLibrary.sol#4) allows old versions
Fragma version "0.8.0" (node_modules/@openzeppelin/contracts/libraries/GameRegistryLibrary.sol#4) allows old versions
AddressUpgradeable.functionCallFor documentation for deprecated functions
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in AddressUpgradeable, _Owable_init() (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#140-165):
- (success) = recipient.call.value(amount) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#140-150)
Low level call in AddressUpgradeable.functionCallWithValue(address,bytes,uint256,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#125-139):
- (success, data) = target.functionCallWithValue(address,bytes,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#137-166)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Function OwableUpgradeable._Owable_init() (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#26-31) is not in mixedCase
Function OwableUpgradeable._Pausable_init() (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol#26-33) is not in mixedCase
Variable OwableUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#14-36) is not in mixedCase
Function PausableUpgradeable._Pauseable_init() (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol#44-49) is not in mixedCase
Function OwableUpgradeable._ReentrancyGuard_init() (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol#4-10) is not in mixedCase
Function OwableUpgradeable._ReentrancyGuard_init() (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol#44-46) is not in mixedCase
Variable ReentrancyGuardUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol#11-18) is not in mixedCase
Function ContextUpgradeable._Context_init() (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol#21-22) is not in mixedCase
Function GameRegistryConsumerUpgradeable._GameRegistryConsumer_init(address) (node_modules/@openzeppelin/contracts-upgradeable/utils/GameRegistryConsumerUpgradeable.sol#32-45) is not in mixedCase
Function LootSystem._setLooots(address) (node_modules/@openzeppelin/contracts-upgradeable/utils/LootSystem.sol#31-35) is not in mixedCase
Variable LootSystem._looots (node_modules/@openzeppelin/contracts-upgradeable/utils/LootSystem.sol#31-35) is not in mixedCase
Function GameRegistryConsumerUpgradeable._GameRegistryConsumer_init(address) (node_modules/@openzeppelin/contracts-upgradeable/utils/GameRegistryConsumerUpgradeable.sol#32-45) is not in mixedCase
Parameter LooootSystem.setLooots (node_modules/@openzeppelin/contracts-upgradeable/utils/LootSystem.sol#31-35) is not in mixedCase
Variable LootSystem._looots (node_modules/@openzeppelin/contracts-upgradeable/utils/LootSystem.sol#31-35) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions
PausableUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol#116) is never used in LootSystem (contracts/LootSystem.sol#21-35)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-state-variable

renounceOwnership() should be declared external:
- OwnableUpgradeable.renounceOwnership() (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#46-48)
transferOwnership(address) should be declared external:
- OwnableUpgradeable.transferOwnership(address) (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#74-77)
initialize(address) should be declared external:
- LootSystem.initialize(address) (contracts/LootSystem.sol#173-184)

supportsInterface(bytes) should be declared external:
- LootSystem.supportsInterface(bytes) (contracts/LootSystem.sol#245-255)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

OwnableUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#4) shadows:
- ContextUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol#165)
PausableUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol#116) shadows:
- OwableUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#164)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variable-shadowing

HoldingSystem.setMilestone(address, HoldingSystem.Milestone[])(contracts/HoldingSystem.sol#80-103) ignores return value by LootSystem.validateLooots(milestone.loots) (contracts/HoldingSystem.sol#101)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#set-return

HoldingSystem.setClaimed(bool), paused (contract/HoldingSystem.sol#19) shadows:
- OwnableUpgradeable.paused (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol#29) (state variable)
HoldingSystem.claimMilestone(address, uint16, uint16) (contract/HoldingSystem.sol#133) shadows:
- OwnableUpgradeable.owner() (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#50) (function)
HoldingSystem.timeHeldSeconds(address, address, uint16) (contract/HoldingSystem.sol#123) shadows:
- OwnableUpgradeable.owner() (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#50) (function)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#local-variable-shadowing

HoldingSystem.setMilestone(address, HoldingSystem.Milestone[])(contracts/HoldingSystem.sol#80-103) has external calls inside a loop: lootSystem.validateLooots(milestone.loots) (contracts/HoldingSystem.sol#101)
HoldingSystem.setMilestone(address, HoldingSystem.Milestone[], address, address, uint16) (contract/HoldingSystem.sol#125-124) has external calls inside a loop: IGameNFT(tokenContract).getTimeHeld(owner, tokenID) > milestone.timeHeldSeconds
HoldingSystem.gettokenStatus(address, address, uint16) (contract/HoldingSystem.sol#166-196) has external calls inside a loop: milestone.timeHeldSeconds > IGameNFT(tokenContract).getTimeHeld(account, tokenID) (contracts/HoldingSystem.sol#83)
HoldingSystem.getLooots(address, address, uint256) (contract/HoldingSystem.sol#166-196) has external calls inside a loop: timeLeftSeconds[iNdEx] = milestone.timeHeldSeconds - IGameNFT(tokenContract).getTimeHeld(account, tokenID) (contracts/HoldingSystem.sol#199)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#calls-inside-a-loop

Reentrancy in HoldingSystem.claimMilestone(address, uint16, uint16) (contract/HoldingSystem.sol#12-154):
- External calls:
  - Executed system function (msg.sender.milestone.loots) (contracts/HoldingSystem.sol#150)
  - Executed after the call(s):
    - MilestoneClaimed(owner, tokenContract, tokenID, milestoneIndex) (contract/HoldingSystem.sol#153)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities-3

GameRegistryConsumerUpgradeable._GameRegistryConsumer_init(address) (node_modules/@openzeppelin/contracts-upgradeable/access/GameRegistryConsumerUpgradeable.sol#160-168) uses timestamp for comparisons
  - Dangerous comparison: successRate >= GameRegistryLibrary.PERCENTAGE_RANGE c successRate (contracts/GameRegistryConsumerUpgradeable.sol#160-166)
GameRegistryConsumerUpgradeable._GameRegistryConsumer_init(address) (node_modules/@openzeppelin/contracts-upgradeable/access/GameRegistryConsumerUpgradeable.sol#179-192) uses timestamp for comparisons
  - Dangerous comparison: successRate >= GameRegistryLibrary.PERCENTAGE_RANGE c successRate (contracts/GameRegistryConsumerUpgradeable.sol#179-187)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#block-timestamp

AddressUpgradeable.verifyCallResult(bool,bytes,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#174-196) uses assembly
  - INLINE_ASM (node_modules/@openzeppelin/contracts-upgradeable/contracts-upgradeable/utils/AddressUpgradeable.sol#186-196)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly

HoldingSystem.setMilestone(address, HoldingSystem.Milestone[])(contracts/HoldingSystem.sol#80-103) compares to a boolean constant:
- require((Bool(string)), hasAccessRole(GameRegistryLibrary.GAME_NFT_CONTRACT_ROLE, tokenContract) == true, TOKEN_NOT_GAME_NFT): tokenContract has not been whitelisted for gameplay) (contracts/HoldingSystem.sol#80-90)
HoldingSystem.setMilestone(address, HoldingSystem.Milestone[], address, address, uint16) (contract/HoldingSystem.sol#125) compares to a boolean constant:
- require((Bool(string)), hasAccessRole(GameRegistryLibrary.GAME_NFT_CONTRACT_ROLE, tokenContract) == true, NFT_IS_UNLOCKED): NFT has not been held long enough) (contracts/HoldingSystem.sol#120-124)
HoldingSystem.claimMilestone(address, uint256, uint16) (contract/HoldingSystem.sol#12-154) compares to a boolean constant:
- require((Bool(string)), (tokenContract.getClaimed(milestoneIndex, tokenID) == false) || (tokenContract.isClaimed(milestoneIndex, tokenID) == false), MILESTONE_ALREADY_CLAIMED): milestone has already been claimed) (contracts/HoldingSystem.sol#124-127)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#bool-constant

Different Versions of Solidity is used:
Version used: ("0.8.0", "+0.8.1", "+0.8.2", "+0.8.3")
- +0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/access/OwableUpgradeable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Upgradeable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC721Enumerable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC721URIUpgradeable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC721Inspection.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/extensions/IERC165.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Lockable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC115Lockable.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IGameNFT.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IGameRegistry.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ILockingSystem.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IReentrancyGuard.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IRandomizerCalibck.sol#4)
- +0.8.0 (node_modules/@openzeppelin/contracts/libraries/GameRegistryLibrary.sol#4)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#different-pragma-directives-are-used

AddressUpgradeable.functionCall(address,bytes,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#5-7) is never used and should be removed
AddressUpgradeable.functionCallWithValue(address,bytes,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#15-16) is never used and should be removed
AddressUpgradeable.functionCallWithValue(address,bytes,uint256,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol#128-139) is never used and should be removed
AddressUpgradeable.functionCallWithValue(address,bytes,uint256) (node_modules/@openzeppelin/contracts-upgradeable/contracts-upgradeable/utils/AddressUpgradeable.sol#14-120) is never used and should be removed
```

AUTOMATED TESTING

QuestSystem.sol

```

AddressUpgradeable.functionStaticCall(address,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@47-149) is never used and should be removed
AddressUpgradeable.functionStaticCall(address,bytes,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@19-166) is never used and should be removed
AddressUpgradeable.sendValue(address,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@46-65) is never used and should be removed
AddressUpgradeable.verifyCallResult(bool,bytes,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@17-194) is never used and should be removed
ContextUpgradeable._Context_init(unchained) (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol@21-23) is never used and should be removed
ContextUpgradeable._msgData() (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol@27-29) is never used and should be removed
GameRegistryConsumerUpgradeable._isNameRegistrySet() (contracts/GameRegistryConsumerUpgradeable.sol@43-45) is never used and should be removed
GameRegistryConsumerUpgradeable._lockingSystem() (contracts/GameRegistryConsumerUpgradeable.sol@9-24) is never used and should be removed
GameRegistryConsumerUpgradeable._removeLockedInput() (contracts/GameRegistryConsumerUpgradeable.sol@37-41) is never used and should be removed
GameRegistryConsumerUpgradeable._weightedCoinFlip(uint256,uint256) (contracts/GameRegistryConsumerUpgradeable.sol@140-149) is never used and should be removed
GameRegistryConsumerUpgradeable._willBurnAddress(address,bytes,tokenType) (contracts/GameRegistryConsumerUpgradeable.sol@165-170) is never used and should be removed
Initializable._disableInitializers() (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol@13-17) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#seed-code

Pragma version=0.8.2 (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol@4) allows old versions
Pragma version=0.8.2 (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol@4) allows old versions
Pragma version=0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol@4) allows old versions
Pragma version=0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@4) allows old versions
Pragma version=0.8.1 (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol@4) allows old versions
Pragma version=0.8.1 (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@4) allows old versions
Pragma version=0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721.sol@4) allow old versions
Pragma version=0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721Enumerable.sol@4) allow old versions
Pragma version=0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721extensions/IERC721Metadata.sol@4) allow old versions
Pragma version=0.8.0 (node_modules/@openzeppelin/contracts/token/ERC721/IERC721URIStorage.sol@4) allow old versions
Pragma version=0.8.0 (contract/GameRegistryConsumerUpgradeable.sol@13) allows old versions
Pragma version=0.8.0 (contract/HoldingSystem.sol@13) allows old versions
Pragma version=0.8.0 (contract/INameRegistry.sol@13) allows old versions
Pragma version=0.8.0 (contract/ILockingSystem.sol@13) allows old versions
Pragma version=0.8.0 (contract/INameRegistry.sol@13) allows old versions
Pragma version=0.8.0 (contract/ILockingSystem.sol@13) allows old versions
Pragma version=0.8.0 (contract/IERC721.sol@13) allows old versions
Pragma version=0.8.0 (contract/IERC721Enumerable.sol@13) allows old versions
Pragma version=0.8.0 (contract/IERC721extensions/IERC721Metadata.sol@13) allows old versions
Pragma version=0.8.0 (contract/IERC721URIStorage.sol@13) allows old versions
Pragma version=0.8.0 (contract/GameRegistryConsumerUpgradeable.sol@13) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorect-versions-of-solidity

Low level call in AddressUpgradeable.sendValue(address,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@60-65):
- (success)= recipient.call.value(amount). (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@63)

Low level call in AddressUpgradeable.functionStaticCall(address,bytes,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@18-129-139):
- (success)= target.functionStaticCall(address,bytes, string). (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@157-166);

Low level call in AddressUpgradeable.functionStaticCall(address,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@157-166):
- (success)= returnedData. (target.staticcall(data)). (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradeable.sol@164)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#function-call-with-low-level-calls

Function PausableUpgradeable._pause() (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol@3) is not in mixedCase
Function PausableUpgradeable._unpause() (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol@3) is not in mixedCase
Variable OwnableUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol@4) is not in mixedCase
Variable PausableUpgradeable._paused (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol@38-40) is not in mixedCase
Function PausableUpgradeable._Pausable_init() (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol@41-42) is not in mixedCase
Function PausableUpgradeable._unpause() (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol@43-44) is not in mixedCase
Variable PausableUpgradeable._Paused (node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradeable.sol@41) is not in mixedCase
Function ReentrancyGuardUpgradeable._ReentrancyGuard_init() (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol@4-6) is not in mixedCase
Function ReentrancyGuardUpgradeable._nonReentrant() (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol@7-18) is not in mixedCase
Variable ReentrancyGuardUpgradeable._nonReentrant (node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradeable.sol@44-46) is not in mixedCase
Function ContextUpgradeable._Context_init() (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol@18-19) is not in mixedCase
Function ContextUpgradeable._Context_init_unchained() (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol@20-23) is not in mixedCase
Variable ContextUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradeable.sol@43) is not in mixedCase
Variable GameRegistryConsumerUpgradeable._GameRegistryConsumer_init(address) (contracts/GameRegistryConsumerUpgradeable.sol@42-45) is not in mixedCase
Parameter HoldingSystem._setPaused(bool)_paused (contracts/HoldingSystem.sol@46) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#function-name-and-conventions

PausableUpgradeable._gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol@11) is never used in HoldingSystem (contracts/HoldingSystem.sol@21-225)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-state-variable

renounceOwnership() should be declared external:
tokensForOwnership(address) (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol@6-68)
transfersForOwnership(address) should be declared external:
- OwnableUpgradeable.transferOwnership(address) (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradeable.sol@74-77)
initializationVariables should be declared external:
- initializationVariables.listInitialAddressesContract(HoldingSystem.sol@17-22)
setMilestones(address,HoldingSystem.Milestone()) should be declared external:
- HoldingSystem.setMilestones(address,HoldingSystem.Milestone()) (contracts/HoldingSystem.sol@80-103)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```


GameGlobals.sol

```

GameRegistryConsumerUpgradable, weightedCoinFlip(uint256,uint256) (contracts/GameRegistryConsumerUpgradable.sol#160-168) uses a weak PERN: "success = nextRandomWord % GameRegistryLibrary.PERCENTAGE_RANGE < successRate" (contracts/GameRegistryConsumerUpgradable.sol#168)
GameRegistryConsumerUpgradable, weightedCoinFlipBatch(uint256,uint256,uint8) (contracts/GameRegistryConsumerUpgradable.sol#179-192) uses a weak PERN: "nextRandomWord % GameRegistryLibrary.PERCENTAGE_RANGE < successRate" (contracts/GameRegistryConsumerUpgradable.sol#192)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#weak-PERN

UtilLibrary, basedBytes (contracts/libraries/UtilLibrary.sol#1-1-82) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_based4,asm_0 - 2,0x3d3d <> 240) (contracts/libraries/UtilLibrary.sol#74)
UtilLibrary, basedBytes (contacts/libraries/UtilLibrary.sol#1-1-82) contains an incorrect shift operation: mstore(uint256,uint256)(resultPtr_based4,asm_0 - 1,0x3d <> 240) (contracts/libraries/UtilLibrary.sol#77)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#shift-parameter-mixup

OwnableUpgradable, gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#5*) shadows:
    - ContextUpgradable, gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#5*)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variable-shadowing

UtilLibrary, basedByBytes (contracts/libraries/UtilLibrary.sol#1-1-82) performs a multiplication on the result of a division:
    - encodesByt = 4 * (data.length - 2) / 3 (contracts/libraries/UtilLibrary.sol#49)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#divide-before-multiply

GameGlobals, validateUnit256datatype (IGameGlobal.GlobalMetadata,uint256) (contracts/GameGlobal.sol#538-555) contains a tautology or contradiction:
    - require(bool,string){value >= 0,INVALID_UNIT_VALUE} (UNIT global be ">= 0") (contracts/GameGlobal.sol#553)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#tautology-or-contradiction

GameRegistryConsumerUpgradable, weightedCoinFlip(uint256,uint256) (contracts/GameRegistryConsumerUpgradable.sol#160-168) uses timestamp for comparisons
    - Dangerous comparison: nextRandomWord % GameRegistryLibrary.PERCENTAGE_RANGE < successRate (contracts/GameRegistryConsumerUpgradable.sol#166)
GameRegistryConsumerUpgradable, weightedCoinFlipBatch(uint256,uint256,uint8) (contracts/GameRegistryConsumerUpgradable.sol#179-192) uses timestamp for comparisons
    - Dangerous comparison: nextRandomWord % GameRegistryLibrary.PERCENTAGE_RANGE < successRate (contracts/GameRegistryConsumerUpgradable.sol#187)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#block-timeout

AddressUpgradable.verifyCalldata1(bytes,bytes,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#186-189)
    - INLINE ASN (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#186)
UtilLibrary, basedByBytes (contracts/libraries/UtilLibrary.sol#1-1-82) uses assembly
    - INLINE ASN (contracts/libraries/UtilLibrary.sol#2-79)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#assembly-usage

Different pragma directives of Solcify:
    - Version used ("0.8.0", "0.8.2", "0.8.4")
        - 0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#4)
        - 0.8.2 (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#1)
        - 0.8.4 (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#1)
    - 0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#4)
    - 0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#4)
    - 0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#1)
    - 0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#3)
    - 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IGameGlobal.sol#9)
    - 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IERC165.sol#3)
    - 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ILOCKSystem.sol#9)
    - 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ILOCKSystem.sol#1)
    - 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ILockSystem.sol#9)
    - 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/ILockSystem.sol#1)
    - 0.8.0 (node_modules/@openzeppelin/contracts/interfaces/IAndeseeCallback.sol#3)
    - 0.8.0 (node_modules/@openzeppelin/contracts/libraries/GameRegistryLibrary.sol#19)
    - 0.8.0 (node_modules/@openzeppelin/contracts/libraries/GameRegistryLibrary.sol#19)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#different-pragma-directives-are-used

AddressUpgradable.functionCall(address,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#55-57) is never used and should be removed
AddressUpgradable.functionCall1(address,bytes,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#59-101) is never used and should be removed
AddressUpgradable.functionCall1WithValue(address,bytes,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#114-120) is never used and should be removed
AddressUpgradable.functionCallStaticCall(address,bytes,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#122-128) is never used and should be removed
AddressUpgradable.functionCallStaticCall(address,bytes,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#137-166) is never used and should be removed
AddressUpgradable.functionCallStaticCall(address,bytes,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#140-149) is never used and should be removed
AddressUpgradable.functionCallStaticCall1(address,bytes,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#151-157) is never used and should be removed
AddressUpgradable.functionCallStaticCall1(address,bytes,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#158-164) is never used and should be removed
AddressUpgradable.functionCallStaticCall1(address,bytes,uint256) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#165-166) is never used and should be removed
ContextUpgradable, Context init() (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#21-22) is never used and should be removed
ContextUpgradable, _msgSender() (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#21-22) is never used and should be removed
ContextUpgradable, _msgValue() (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#21-22) is never used and should be removed
ContextUpgradable, msg.sender (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#21-22) is never used and should be removed
ContextUpgradable, msg.value (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#21-22) is never used and should be removed
GameGlobals, validateUnit256datatype (IGameGlobal.GlobalMetadata,uint256) (contracts/GameGlobal.sol#538-555) is never used and should be removed
GameRegistryConsumerUpgradable, getSystemAddress(uint16) (contracts/GameRegistryConsumerUpgradable.sol#101-106) is never used and should be removed
GameRegistryConsumerUpgradable, getSystemAddress1(uint16) (contracts/GameRegistryConsumerUpgradable.sol#107-112) is never used and should be removed
GameRegistryConsumerUpgradable, isNameRegistrySet () (contracts/GameRegistryConsumerUpgradable.sol#133-135) is never used and should be removed
GameRegistryConsumerUpgradable, isNameRegistrySet() (contracts/GameRegistryConsumerUpgradable.sol#133-135) is never used and should be removed
GameRegistryConsumerUpgradable, lockingSystem () (contracts/GameRegistryConsumerUpgradable.sol#55-56) is never used and should be removed
GameRegistryConsumerUpgradable, nextRandomWord(uint256) (contracts/GameRegistryConsumerUpgradable.sol#133-135) is never used and should be removed
GameRegistryConsumerUpgradable, requestNonce(uint16) (contracts/GameRegistryConsumerUpgradable.sol#113-119) is never used and should be removed
GameRegistryConsumerUpgradable, setInitializable(address) (node_modules/@openzeppelin/contracts-upgradeable/proxy/Initializable.sol#1-17) is never used and should be removed
GameRegistryConsumerUpgradable, transferOwnership(address) (node_modules/@openzeppelin/contracts-upgradeable/proxy/Initializable.sol#1-17) is never used and should be removed
Initializable, disableInitializable () (node_modules/@openzeppelin/contracts-upgradeable/proxy/Initializable.sol#131-137) is never used and should be removed
UtilLibrary, int2str(int256) (node_modules/@openzeppelin/contracts/libraries/UtilLibrary.sol#5-110) is never used and should be removed
UtilLibrary, int2str(int256) (node_modules/@openzeppelin/contracts/libraries/UtilLibrary.sol#5-110) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code

Pragma version 0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#4) allows old versions
Pragma version 0.8.0.2 (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol#4) allows old versions
Pragma version 0.8.0.5 (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/UUPSUpgradeability.sol#4) allows old versions
Pragma version 0.8.0.6 (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#4) allows old versions
Pragma version 0.8.0.7 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#4) allows old versions
Pragma version 0.8.0.8 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#3) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#2) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#1) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#0) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#19) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#44) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#45) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#46) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#47) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#48) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#49) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#50) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#51) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#52) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#53) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#54) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#55) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#56) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#57) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#58) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#59) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#60) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#61) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#62) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#63) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#64) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#65) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#66) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#67) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#68) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#69) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#70) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#71) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#72) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#73) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#74) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#75) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#76) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#77) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#78) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#79) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#80) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#81) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#82) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#83) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#84) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#85) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#86) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#87) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#88) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#89) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#90) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#91) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#92) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#93) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#94) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#95) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#96) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#97) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#98) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#99) allows old versions
Pragma version 0.8.0.9 (node_modules/@openzeppelin/contracts-upgradeable/utils/introspection/IERC165.sol#100) allows old versions
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in AddressUpgradable.sendValue(address,uint256) (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#65):
    - (success) = recipient.call{value:(amount)} (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol#6)
Low level call in AddressUpgradable.functionCall1(address,bytes,bytes) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#128-139):
    - (success) = recipient.functionCall1(address,(bytes),(bytes)) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#128-139);
Low level call in AddressUpgradable.functionCallStaticCall1(address,bytes,string) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#157-166):
    - (success,reurndata) = target.staticcall(data) (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#157)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-calls

Function OwnableUpgradable, Ownable init() (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#25-31) is not in mixedCase
Function OwnableUpgradable, _msgSender() (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#35-41) is not in mixedCase
Variable OwnableUpgradable._msgValue() (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#19-25) is not in mixedCase
Function ContextUpgradable, Context init() (node modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#119-125) is not in mixedCase
Function ContextUpgradable, _msgData() (node modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#119-125) is not in mixedCase
Variable ContextUpgradable._msgSender() (node modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#122-128) is not in mixedCase
Variable ContextUpgradable._msgValue() (node modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#122-128) is not in mixedCase
Function GameRegistryConsumerUpgradable, _init(address) (contracts/GameRegistryConsumerUpgradable.sol#32-49) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

OwnableUpgradable, gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#4) is never used in GameGlobal (contracts/GameGlobal.sol#12-56)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-state-variable

renounceOwnership() should be declared external:
    - OwnableUpgradable, renounceOwnership() (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#66-68)
transferOwnership(address) should be declared external:
    - OwnableUpgradable, transferOwnership(address) (node modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#74-77)
initialize(address) should be declared external:
    - OwnableUpgradable.initialize(address) (node modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#46-48)

supportsInterface(bytes4) should be declared external:
    - GameGlobal.supportsInterface(bytes4) (contracts/GameGlobal.sol#447-447)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

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CraftingSystem.sol

```

GameRegistryConsumerUpgradable, weightedCoinFlip(uint256,uint256) (contracts/GameRegistryConsumerUpgradable.sol#160-174) uses a weak PERN: "success = nextRandomWord % GameRegistryLibrary.PERCENTAGE_RANGE < successRate" (contracts/GameRegistryConsumerUpgradable.sol#168)
GameRegistryConsumerUpgradable, weightedCoinFlipBatch(uint256,uint256,uint8) (contracts/GameRegistryConsumerUpgradable.sol#185-205) uses a weak PERN: "nextRandomWord % GameRegistryLibrary.PERCENTAGE_RANGE < successRate" (contracts/GameRegistryConsumerUpgradable.sol#199)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#weak-PERN

OwnableUpgradable, gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#87) shadows:
    - ContextUpgradable, gap (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#87)
FaissablyUpgradable, gap (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#102) shadows:
    - ContextUpgradable, gap (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#102)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#state-variable-shielding

Reentrancy in CraftingSystem.craft(CraftingSystem.CraftParams) (contracts/CraftingSystem.sol#531-544):
    External calls:
        - INameCurrencyInput, nameFromAddress(account,reqId,tokenType) (contracts/CraftingSystem.sol#421-424)
        - CSReserveToken, mintToken(account,reqId,tokenType,amount) (contracts/CraftingSystem.sol#425-428)
        - reservationId, lockContract, andNFTReservation(input,tokenContract,input.tokenId,true,gameRegistryLibrary.RESERVATION_CRAFTING_SYSTEM) (contracts/CraftingSystem.sol#437-442)
        - _lockingSystem, unlockAndBurnToken(account, input, tokenContract, input.tokenId, requiredInputAmount) (contracts/CraftingSystem.sol#447-452)
        - gameRegistryLibrary.reserveToken(input,tokenContract,input.tokenId,requiredInputAmount,reservationId) (contracts/CraftingSystem.sol#455-462)
        - staticVariables (written after the call):
            - activeCrafts, input.push(GameRegistryLibrary.ReservedToken(input.tokenType, input.tokenContract, input.tokenId, requiredInputAmount, reservationId)) (contracts/CraftingSystem.sol#466-475)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#reentrancy-vulnerabilities

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- "0.8.0 (contracts/GemRegistryConsumerUpgradeable.sol#8)
- "0.8.0 (contracts/energy/EnergySystem.sol#3)
- "0.8.0 (contracts/interface/IERC721Lockable.sol#8)
- "0.8.0 (contracts/interface/IReentrancyGuard.sol#3)
- "0.8.0 (contracts/interface/IOwnerRegistry.sol#3)
- "0.8.0 (contracts/interface/ILockingsystem.sol#8)
- "0.8.0 (contracts/interface/IReentrancyGuard.sol#3)
- "0.8.0 (contracts/interface/IRandomizer.sol#8)
- "0.8.0 (contracts/interface/IRandomizerCalculus.sol#8)
- "0.8.0 (contracts/interface/ISafeCast.sol#8)
- "0.8.0 (contracts/interface/ISafeMath.sol#8)

Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#different-pragma-directives-are-used

AddressUpgradable.functionCall(address,bytes,(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#5-8)) is never used and should be removed
AddressUpgradable.functionCall(address,bytes,string,(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#95-101)) is never used and should be removed
AddressUpgradable.functionCallWithValue(address,uint256,(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#114-120)) is never used and should be removed
AddressUpgradable.functionStaticCall(address,bytes,(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#157-160)) is never used and should be removed
AddressUpgradable.functionStaticCallWithValue(address,bytes,uint256,(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#157-166)) is never used and should be removed
AddressUpgradable.verifyCallWithValue(bool,bytes,string,(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#174-194)) is never used and should be removed
ContextUpgradable. ContextUnit((node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#18-19)) is never used and should be removed
ContextUpgradable. ContextUnit((node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#19-20)) is never used and should be removed
GameRegistryConsumerUpgradeable. getSystem(uint16)(contracts/GameRegistryConsumerUpgradeable.sol#10-19) is never used and should be removed
GameRegistryConsumerUpgradeable. getName(string)(contracts/GameRegistryConsumerUpgradeable.sol#12-20) is never used and should be removed
GameRegistryConsumerUpgradeable. getLocation(string)(contracts/GameRegistryConsumerUpgradeable.sol#97-99) is never used and should be removed
GameRegistryConsumerUpgradeable. getOwner(string)(contracts/GameRegistryConsumerUpgradeable.sol#100-102) is never used and should be removed
GameRegistryConsumerUpgradeable. newOwner(string)(contracts/GameRegistryConsumerUpgradeable.sol#111-119) is never used and should be removed
GameRegistryConsumerUpgradeable. weightedsignflip(uint256,uint256)(contracts/GameRegistryConsumerUpgradeable.sol#140-174) is never used and should be removed
GameRegistryConsumerUpgradeable. weightedCoinFlip(uint256,uint256)(contracts/GameRegistryConsumerUpgradeable.sol#145-150) is never used and should be removed
IntSafeCast.toInt248(int256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#52-159) is never used and should be removed
SafeCast.toInt128(int256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#106-209) is never used and should be removed
SafeCast.toInt16(int256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#107-110) is never used and should be removed
SafeCast.toInt32(int256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#108-135) is never used and should be removed
SafeCast.toInt64(int256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#170-173) is never used and should be removed
SafeCast.toInt96(int256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#174-177) is never used and should be removed
SafeCast.toInt128(uint256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#47-50) is never used and should be removed
SafeCast.toInt16(uint256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#107-110) is never used and should be removed
SafeCast.toInt32(uint256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#134-137) is never used and should be removed
SafeCast.toInt64(uint256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#177-180) is never used and should be removed
SafeCast.toInt96(uint256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#181-184) is never used and should be removed
SafeCast.toInt128(uint256),(node_modules/@openzeppelin/contracts/utils/math/SafeCast.sol#42-45) is never used and should be removed
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#dead-code

Pragma version"0.8.0 (node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#4) allows old versions
Pragma version"0.8.2 (node_modules/@openzeppelin/contracts-upgradeable/proxy/utils/Initializable.sol#4) allows old versions
Pragma version"0.8.3 (node_modules/@openzeppelin/contracts-upgradeable/proxy/Proxy.sol#4) allows old versions
Pragma version"0.8.4 (node_modules/@openzeppelin/contracts-upgradeable/proxy/ERC1967Proxy.sol#4) allows old versions
Pragma version"0.8.1 (node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#4) allows old versions
Pragma version"0.8.1 (node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#4) allows old versions
Pragma version"0.8.1 (node_modules/@openzeppelin/contracts/token/tokens/IERC721Extensions.sol#4) allows old versions
Pragma version"0.8.0 (node_modules/@openzeppelin/contracts/token/tokens/IERC165.sol#4) allows old versions
Pragma version"0.8.0 (node_modules/@openzeppelin/contracts/token/introspection/IERC165.sol#4) allows old versions
Pragma version"0.8.0 (node_modules/@openzeppelin/contracts/token/introspection/IERC166.sol#4) allows old versions
Pragma version"0.8.0 (contracts/GameRegistryConsumerUpgradeable.sol#3) allows old versions
Pragma version"0.8.0 (contracts/energy/EnergySystem.sol#3) allows old versions
Pragma version"0.8.0 (contracts/energy/EnergySystem.sol#8) too recent to be trusted. Consider deploying with 0.6.12/0.7.6/0.8.7
Pragma version"0.8.0 (contracts/interface/IERC721Locatable.sol#3) allows old versions
Pragma version"0.8.0 (contracts/interface/IOwnerNTT.sol#3) allows old versions
Pragma version"0.8.0 (contracts/interface/IOwnerNTT.sol#8) allows old versions
Pragma version"0.8.1 (contracts/interface/IOwnerRegistry.sol#3) allows old versions
Pragma version"0.8.1 (contracts/interface/ILootSystem.sol#3) necessitates a contract version too recent to be trusted. Consider deploying with 0.6.12/0.7.6/0.8.7
Pragma version"0.8.0 (contracts/interface/IRandomizer.sol#3) allows old versions
Pragma version"0.8.0 (contracts/interface/ISafeCast.sol#3) allows old versions
Pragma version"0.8.0 (contracts/interface/ISafeMath.sol#3) allows old versions
Pragma version"0.8.0 (contracts/libraries/GameRegistryLibrary.sol#3) allows old versions
solc-0.8.8 is not recommended for deployment
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#incorrect-versions-of-solidity

Low level call in AddressUpgradable.sendValue(address,uint256),(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#60-65);
Low level call in AddressUpgradable.functionCallWithValue(address,bytes,int256,string),(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#128-139);
Low level call in AddressUpgradable.functionCallWithValue(address,bytes,int256,string),(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#157-166);
Low level call = target.callWithValue(value)(data),(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#137);
Low level call in AddressUpgradable.functionCallWithValue(address,bytes,int256,string),(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#157-166);
Low level call = target.staticcall(data),(node_modules/@openzeppelin/contracts-upgradeable/utils/AddressUpgradable.sol#137)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#low-level-call

Function OwnableUpgradable. Ownable_init()(node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#21-31) is not in mixedCase
Function OwnableUpgradable. Ownable_init_unchained()(node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#183-195) is not in mixedCase
Variable OwnableUpgradable. _owner(string)(node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#14-16) is not in mixedCase
Function OwnableUpgradable. renounceOwnership()(node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#154-156) is not in mixedCase
Function PausableUpgradable. Pausable_give__(node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradable.sol#39-40) is not in mixedCase
Variable PausableUpgradable. __give__(node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradable.sol#102) is not in mixedCase
Function ReentrancyGuardUpgradable. _reentrancyGuardUnchained()(node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradable.sol#44-46) is not in mixedCase
Variable ReentrancyGuardUpgradable. __gap((node_modules/@openzeppelin/contracts-upgradeable/security/ReentrancyGuardUpgradable.sol#74) is not in mixedCase
Function ContextUpgradable. Context_init_unchained()(node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#21-22) is not in mixedCase
Variable ContextUpgradable. __gap((node_modules/@openzeppelin/contracts-upgradeable/utils/ContextUpgradable.sol#36) is not in mixedCase
Function EnergySystem.setPaused(bool),_paused_(contracts/energy/EnergySystem.sol#7) is not in mixedCase
Parameter EnergySystem.setPaused(bool),_paused_(contracts/energy/EnergySystem.sol#7) is not in mixedCase
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#conformance-to-solidity-naming-conventions

PausableUpgradable._gap((node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradable.sol#102) is never used in EnergySystem (contracts/energy/EnergySystem.sol#22-239)
PausableUpgradable._gap((node_modules/@openzeppelin/contracts-upgradeable/security/PausableUpgradable.sol#102) is never used in EnergySystem (contracts/energy/EnergySystem.sol#59-61)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#unused-state-variable

renounceOwnership() should be declared external;
- OwnableUpgradable.renounceOwnership()(node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#59-61)
transferOwnership(address) should be declared external;
- OwnableUpgradable.transferOwnership(address)(node_modules/@openzeppelin/contracts-upgradeable/access/OwnableUpgradable.sol#67-70)
initialize(address) should be declared external;
- EnergySystem.initialize(address)(contracts/energy/EnergySystem.sol#55-60)
setContractActive(address,bool) should be declared external;
- EnergySystem.setContractActive(address,bool)(contracts/energy/EnergySystem.sol#78-90)
getContractActive(address) should be declared external;
- EnergySystem.getContractActive(address)(contracts/energy/EnergySystem.sol#93-105)
Reference: https://github.com/crytic/slither/wiki/Detector-Documentation#public-function-that-could-be-declared-external

```

- `tx.origin` authorization is used in multiple contracts which can be abused if a legitimate user interacts with a malicious contract.
- All the reentrancies flagged by Slither were checked individually. All of them except one (**HAL04 - REENTRANCY IN RAFFLEMINTV1. WITHDRAWNONRAFFLEPROCEEDS**) are false positives.
- The deletion on a mapping containing a structure was checked, although we did not find any exploitation path for it.
- The shift parameter mixup flagged by Slither is a false positive.
- The weak PRNG is a false positive, as the contracts make use of Chainlink VRF to generate random numbers.

4.2 AUTOMATED SECURITY SCAN

Description:

Halborn used automated security scanners to assist with detection of well-known security issues and to identify low-hanging fruits on the targets for this engagement. Among the tools used was MythX, a security analysis service for Ethereum smart contracts. MythX performed a scan on the smart contracts and sent the compiled results to the analyzers in order to locate any vulnerabilities.

MythX results:

ERC721BridgableChild.sol

Line	SWC Title	Severity	Short Description
3	(SWC-103) FloatingPragma	Low	A floating pragma is set.

ERC721BridgableParent.sol

Line	SWC Title	Severity	Short Description
3	(SWC-103) FloatingPragma	Low	A floating pragma is set.
12	(SWC-123) RequirementViolation	Low	Requirement violation.
26	(SWC-108) StateVariableDefaultVisibility	Low	State variable visibility is not set.

ERC721Lockable.sol

Line	SWC Title	Severity	Short Description
2	(SWC-103) FloatingPragma	Low	A floating pragma is set.
36	(SWC-115) Authorizationthroughtx.origin	Low	Use of "tx.origin" as a part of authorization control.
71	(SWC-115) Authorizationthroughtx.origin	Low	Use of "tx.origin" as a part of authorization control.
91	(SWC-115) Authorizationthroughtx.origin	Low	Use of "tx.origin" as a part of authorization control.

ERC1155Lockable.sol

Line	SWC Title	Severity	Short Description
2	(SWC-103) FloatingPragma	Low	A floating pragma is set.
12	(SWC-123) RequirementViolation	Low	Requirement violation.
15	(SWC-108) StateVariableDefaultVisibility	Low	State variable visibility is not set.

GameItems.sol

Report for contracts/GameItems.sol

<https://dashboard.mythx.io/#/console/analyses/2563d67c-3a34-454e-834d-66de93f7dc6d>

Line	SWC Title	Severity	Short Description
2	(SWC-103) Floating Pragma	Low	A floating pragma is set.
48	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.
131	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
131	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered
137	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
142	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
167	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-=" discovered
185	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
210	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
339	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
342	(SWC-110) Assert Violation	Unknown	Out of bounds array access

GameNFT.sol

Report for contracts/GameNFT.sol

<https://dashboard.mythx.io/#/console/analyses/92cfb69e-fa70-4a83-8e8b-bf6068ebffcf>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
25	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.
66	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
85	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
178	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
179	(SWC-110) Assert Violation	Unknown	Out of bounds array access

GameRegistry.sol

Report for contracts/GameRegistry.sol

<https://dashboard.mythx.io/#/console/analyses/70379212-3519-4bd5-987d-d030785458f4>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
64	(SWC-120) Weak Sources of Randomness from Chain Attributes	Low	Potential use of "block.number" as source of randomness.
79	(SWC-120) Weak Sources of Randomness from Chain Attributes	Low	Potential use of "block.number" as source of randomness.

GameRegistryConsumer.sol

Report for contracts/GameRegistryConsumer.sol

<https://dashboard.mythx.io/#/console/analyses/0df9lad5-d7f0-4a44-ad8a-64e69a3c5led>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.

GoldToken.sol

Report for contracts/GoldToken.sol

<https://dashboard.mythx.io/#/console/analyses/bld457e4-3cef-478c-ba8d-8e4a83676fdb>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.

LockingSystem.sol

Report for contracts/LockingSystem.sol

<https://dashboard.mythx.io/#/console/analyses/ba5bb933-cd3e-4a4e-a2e3-1d8b688953cf>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
198	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
199	(SWC-110) Assert Violation	Unknown	Out of bounds array access

PirateGameV1.sol

Report for contracts/PirateGameV1.sol
<https://dashboard.mythx.io/#/console/analyses/b6053c70-918c-4ce0-a273-a92368a4d3cl>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
60	(SWC-110) Assert Violation	Unknown	Public state variable with array type causing reachable exception by default.
67	(SWC-110) Assert Violation	Unknown	Public state variable with array type causing reachable exception by default.
70	(SWC-110) Assert Violation	Unknown	Public state variable with array type causing reachable exception by default.
85	(SWC-110) Assert Violation	Unknown	Public state variable with array type causing reachable exception by default.
188	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
211	(SWC-110) Assert Violation	Unknown	Out of bounds array access
228	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
229	(SWC-110) Assert Violation	Unknown	Out of bounds array access
272	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
293	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
314	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
321	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
352	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
371	(SWC-110) Assert Violation	Unknown	Out of bounds array access
379	(SWC-110) Assert Violation	Unknown	Out of bounds array access
380	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
390	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
405	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
410	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
423	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
425	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
425	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
428	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
429	(SWC-110) Assert Violation	Unknown	Out of bounds array access
429	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "==" discovered
429	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "//" discovered
436	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
440	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered

200	(SWC-110) Assert Violation	Unknown	Out of bounds array access
228	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
229	(SWC-110) Assert Violation	Unknown	Out of bounds array access
286	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
286	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
318	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
318	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
319	(SWC-110) Assert Violation	Unknown	Out of bounds array access
320	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
320	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
322	(SWC-110) Assert Violation	Unknown	Out of bounds array access
375	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
391	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
410	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
410	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
446	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
446	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
447	(SWC-110) Assert Violation	Unknown	Out of bounds array access
448	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
448	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
450	(SWC-110) Assert Violation	Unknown	Out of bounds array access
459	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered
466	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
469	(SWC-110) Assert Violation	Unknown	Out of bounds array access
772	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "--" discovered

440	(SWC-110) Assert Violation	Unknown	Out of bounds array access
440	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+*" discovered
445	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-*" discovered
473	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+==" discovered
486	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+!*" discovered
491	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "%*" discovered
492	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+!*" discovered
494	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+!*" discovered
499	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-==" discovered
506	(SWC-110) Assert Violation	Unknown	Out of bounds array access
507	(SWC-110) Assert Violation	Unknown	Out of bounds array access
512	(SWC-110) Assert Violation	Unknown	Out of bounds array access
513	(SWC-110) Assert Violation	Unknown	Out of bounds array access

PirateNFT.sol

Report for contracts/PirateNFT.sol
<https://dashboard.mythx.io/#/console/analyses/b0033e7a-542a-4f43-ac10-f914ba872dd4>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.

PirateNFTParent.sol

Report for contracts/PirateNFTParent.sol
<https://dashboard.mythx.io/#/console/analyses/fc238df7-db11-48f2-ab8d-fdc4c40c3e8d>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.

RaffleMintV1.sol

Report for contracts/RaffleMintV1.sol
<https://dashboard.mythx.io/#/console/analyses/690eb124-543c-45fb-827d-3fe281cc7cb7>

3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
56	(SWC-110) Assert Violation	Unknown	Public state variable with array type causing reachable exception by default.
223	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "**" discovered
240	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+*" discovered
245	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+==" discovered
250	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+==" discovered
270	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "**" discovered
313	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+!*" discovered
315	(SWC-110) Assert Violation	Unknown	Out of bounds array access
319	(SWC-110) Assert Violation	Unknown	Out of bounds array access
324	(SWC-110) Assert Violation	Unknown	Out of bounds array access
329	(SWC-110) Assert Violation	Unknown	Out of bounds array access
332	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+*" discovered
338	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+!*" discovered
345	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-*" discovered
345	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "**" discovered
357	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-==" discovered
364	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-==" discovered
393	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-*" discovered
400	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-==" discovered
409	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+!*" discovered
409	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+*" discovered
411	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "%*" discovered
411	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+*" discovered
411	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-*" discovered
413	(SWC-110) Assert Violation	Unknown	Out of bounds array access
415	(SWC-110) Assert Violation	Unknown	Out of bounds array access
417	(SWC-110) Assert Violation	Unknown	Out of bounds array access
421	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+==" discovered

Randomizer.sol

Report for contracts/Randomizer.sol

<https://dashboard.mythx.io/#/console/analyses/b12c4498-963e-4700-8908-85327f9a9390>

Line	SWC Title	Severity	Short Description
2	(SWC-103) Floating Pragma	Low	A floating pragma is set.
24	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.
27	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.
35	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.
38	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.

StakingSystem.sol

Report for contracts/StakingSystem.sol

<https://dashboard.mythx.io/#/console/analyses/a219f607-a818-4c68-9dbd-937f7af50fffc>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
36	(SWC-110) Assert Violation	Unknown	Public state variable with array type causing reachable exception by default.
100	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.
103	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.
215	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
224	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
235	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
236	(SWC-110) Assert Violation	Unknown	Out of bounds array access
237	(SWC-110) Assert Violation	Unknown	Out of bounds array access
260	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "*=" discovered
260	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
293	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
302	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
325	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
326	(SWC-110) Assert Violation	Unknown	Out of bounds array access
327	(SWC-110) Assert Violation	Unknown	Out of bounds array access
360	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-=" discovered
396	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
410	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
412	(SWC-110) Assert Violation	Unknown	Out of bounds array access
413	(SWC-110) Assert Violation	Unknown	Out of bounds array access
431	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
439	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
440	(SWC-110) Assert Violation	Unknown	Out of bounds array access
448	(SWC-110) Assert Violation	Unknown	Out of bounds array access
451	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
456	(SWC-110) Assert Violation	Unknown	Out of bounds array access
457	(SWC-110) Assert Violation	Unknown	Out of bounds array access
465	(SWC-110) Assert Violation	Unknown	Out of bounds array access

466	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered
466	(SWC-101) Integer Overflow and Underflow	Unknown	Compiler-rewritable "<uint> - 1" discovered
502	(SWC-110) Assert Violation	Unknown	Out of bounds array access
524	(SWC-110) Assert Violation	Unknown	Out of bounds array access
546	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
550	(SWC-110) Assert Violation	Unknown	Out of bounds array access
551	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
552	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
627	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered
627	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "/" discovered
627	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "*" discovered
640	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "*" discovered
643	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "*" discovered
650	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "*" discovered
652	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered
661	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.
678	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
682	(SWC-110) Assert Violation	Unknown	Out of bounds array access
683	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
684	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
758	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered
764	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "/" discovered
764	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "*" discovered
767	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered
775	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-=" discovered
809	(SWC-110) Assert Violation	Unknown	Out of bounds array access
813	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "***" discovered
813	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "%" discovered
819	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
825	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "/" discovered
825	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "*" discovered
827	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered
856	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
861	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+=" discovered
862	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
862	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "/" discovered
890	(SWC-110) Assert Violation	Unknown	Out of bounds array access

TraitsConsumer.sol

Report for contracts/TraitsConsumer.sol
<https://dashboard.mythx.io/#/console/analyses/b349bf5d-ac11-45fe-a5c2-36aa29de3541>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
437	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
438	(SWC-110) Assert Violation	Unknown	Out of bounds array access

TraitsProvider.sol

Report for contracts/TraitsProvider.sol
<https://dashboard.mythx.io/#/console/analyses/2fa20588-48d6-4e30-8aea-calf78faad76>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
128	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
129	(SWC-110) Assert Violation	Unknown	Out of bounds array access
174	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
175	(SWC-110) Assert Violation	Unknown	Out of bounds array access
226	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
278	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "-" discovered

StagedMintV1.sol

Report for contracts/StagedMintV1.sol
<https://dashboard.mythx.io/#/console/analyses/dcecel27-e9c2-4937-8f62-88e9b7e185cl>

Line	SWC Title	Severity	Short Description
2	(SWC-103) Floating Pragma	Low	A floating pragma is set.
135	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation *** discovered
140	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation *** discovered
159	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
164	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
183	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation *** discovered
231	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered
232	(SWC-110) Assert Violation	Unknown	Out of bounds array access
267	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "+" discovered
272	(SWC-101) Integer Overflow and Underflow	Unknown	Arithmetic operation "++" discovered

LootSystem.sol

Report for contracts/LootSystem.sol
<https://dashboard.mythx.io/#/console/analyses/762lcl9d-eaid-4439-8d88-2ca1840e508c>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
59	(SWC-108) State Variable Default Visibility	Low	State variable visibility is not set.

HoldingSystem.sol

Report for contracts/HoldingSystem.sol
<https://dashboard.mythx.io/#/console/analyses/c6552424-cf4e-4adf-bd5a-71f27fca0b22>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
21	(SWC-123) Requirement Violation	Low	Requirement violation.

QuestSystem.sol

Report for contracts/QuestSystem.sol
<https://dashboard.mythx.io/#/console/analyses/400a3a52-ee09-4c70-a6af-5e9a2c80fbc9>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
25	(SWC-123) Requirement Violation	Low	Requirement violation.

GameGlobals.sol

CraftingSystem.sol

Report for contracts/CraftingSystem.sol
<https://dashboard.mythx.io/#/console/analyses/0b63e96e-d059-4d0d-8593-699cdc7eac66>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
23	(SWC-123) Requirement Violation	Low	Requirement violation.

EnergySystem.sol

Report for contracts/energy/EnergySystem.sol
<https://dashboard.mythx.io/#/console/analyses/2fcdbd836-2c6d-4169-8f86-dd63d2b6103e>

Line	SWC Title	Severity	Short Description
3	(SWC-103) Floating Pragma	Low	A floating pragma is set.
22	(SWC-123) Requirement Violation	Low	Requirement violation.
125	(SWC-115) Authorization through tx.origin	Low	Use of "tx.origin" as a part of authorization control.

- The requirement violations and assert violations are all false

positives.

- Some state variables are missing the public/private keyword.
- A floating pragma was correctly flagged by MythX.
- Authorization through tx.origin was correctly flagged by MythX.
- Integer Overflows and Underflows flagged by MythX are false positives, as all the contracts are using Solidity ^0.8.0 version. After the Solidity version 0.8.0 Arithmetic operations revert to underflow and overflow by default.
- block.number is not being used as a source of randomness.

THANK YOU FOR CHOOSING
 HALBORN