

# Assure DeFi<sup>®</sup>

THE VERIFICATION **GOLD STANDARD**



## Security Assessment

### Mullet

Date: 23/05/2024

Audit Status: PASS

Audit Edition: Advanced

# Risk Analysis

## Vulnerability summary

Classification	Description
● High	High-level vulnerabilities can result in the loss of assets or manipulation of data.
● Medium	Medium-level vulnerabilities can be challenging to exploit, but they still have a considerable impact on smart contract execution, such as allowing public access to critical functions.
● Low	Low-level vulnerabilities are primarily associated with outdated or unused code snippets that generally do not significantly impact execution, sometimes they can be ignored.
● Informational	Informational vulnerabilities, code style violations, and informational statements do not affect smart contract execution and can typically be disregarded.

## Executive Summary

According to the Assure assessment, the Customer's smart contract is **Well Secured**.

Insecure	Poorly Secured	Secured	<b><u>Well Secured</u></b>

# Scope

## Target Code And Revision

For this audit, we performed research, investigation, and review of the Mullet contracts followed by issue reporting, along with mitigation and remediation instructions outlined in this report.

## Target Code And Revision

<b>Project</b>	Assure
<b>Language</b>	Solidity
<b>Codebase</b>	<p>Version 1: File: mullet-main.zip [SHA256 Hash]: <a href="#">da34959452c8b09272665b5a9904edc0ecb032096b3e99286da20eecb37d9c4f</a></p> <p><a href="#">Fixed version + additional features:</a> File: mullet-main_v2.zip [SHA256 Hash]: <a href="#">679094ff606fdf82d5944d4c9fb888751bc0a5cc d1bae89fe0304b3c292dfee5</a></p> <p>File: mullet-main.v3.zip [SHA256 hash]: <a href="#">fb7b98cdc900b2af60606f3d15946ed1c58170358ecd6fb275c7eeb6da0e4d72</a></p>
<b>Audit Methodology</b>	Static, Manual

# Attacks made to the contract

In order to check for the security of the contract, we tested several attacks in order to make sure that the contract is secure and follows best practices.

Category	Item
Code review & Functional Review	<ul style="list-style-type: none"><li>• Compiler warnings.</li><li>• Race conditions and Reentrancy.</li><li>• Cross-function race conditions.</li><li>• Possible delays in data delivery.</li><li>• Oracle calls.</li><li>• Front running.</li><li>• Timestamp dependence.</li><li>• Integer Overflow and Underflow.</li><li>• DoS with Revert.</li><li>• DoS with block gas limit.</li><li>• Methods execution permissions.</li><li>• Economy model.</li><li>• Private user data leaks.</li><li>• Malicious Event log.</li><li>• Scoping and Declarations.</li><li>• Uninitialized storage pointers.</li><li>• Arithmetic accuracy.</li><li>• Design Logic.</li><li>• Cross-function race conditions.</li><li>• Safe Zeppelin module.</li><li>• Fallback function security.</li><li>• Overpowered functions / Owner privileges</li></ul>

# AUDIT OVERVIEW



HIGH

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No high severity issues were found.



MEDIUM

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No medium severity issues were found.



LOW

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No low severity issues were found.



INFORMATIONAL

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**Contract:** GameTheoryRewards

**Function:** paybackLastClaim()

**Issue:** There is a scenario where a user can call claim() and then immediately call paybackLastClaim(). If \_removeShares() calls \_depositRewards() and this function is called again after \_removeShares(), it triggers the require(\_amount > 0 && totalShares > 0, 'D0'); statement, causing a revert. This results in the user being unable to execute paybackLastClaim() due to the lack of available totalShares.

**Solution:** Review and adjust the internal logic of the function.

**Fix:** Single token holder edge case was fixed version

[[679094ff606fdf82d5944d4c9fb888751bc0a5ccd1bae89fe0304b3c292dfee5](#)]

# Testing coverage

During the testing phase, custom use cases were written to cover all the logic of contracts. \*Check "Annexes" to see the testing code.

**Mullet contracts tests:**

```
tests/test_rewards.py::test_update RUNNING
Transaction sent: 0x5b5dd79b04e9f8765fd4103ef007d0972eb9e4dfffb71f828f5224f7ec0cf2ec8
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 0
    GameTheoryRewards.constructor confirmed  Block: 1  Gas used: 871611 (7.26%)
      GameTheoryRewards deployed at: 0x3194cBDC3dbcd3E11a07892e7bA5c3394048Cc87

Transaction sent: 0x464c368d1c05dabb84b8c373dc0fb3fd0ca1da9adf45defa478e97bb0c45cef
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 0
    GameTheoryRewards.update confirmed (T)  Block: 2  Gas used: 21976 (0.18%)

Transaction sent: 0x767f08510461f2e8b3a76622ac95a12324b2fcfe3a4c5afeeb9b9d42d7e5841a
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 1
    GameTheoryRewards.update confirmed  Block: 3  Gas used: 93851 (0.78%)

Transaction sent: 0x3088499cf58c64877030c29df3b86a60085ffd520fb492d912113810d7c77b91
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 2
    GameTheoryRewards.update confirmed (R)  Block: 4  Gas used: 23262 (0.19%)

Transaction sent: 0x9c3d406556144b12c46bc57da7d75a6351b348f19f7edaf3ae5524d1c2147b3
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 3
    GameTheoryRewards.update confirmed  Block: 5  Gas used: 25870 (0.22%)

tests/test_rewards.py::test_update PASSED
tests/test_rewards.py::test_claim RUNNING
Transaction sent: 0x50875efe5183ecad0dff8b32940648fcab2b32ac02fd9d24e7bbc152c8091f63
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 4
    GameTheoryRewards.constructor confirmed  Block: 6  Gas used: 871611 (7.26%)
      GameTheoryRewards deployed at: 0xe0aA552A10d7EC8760Fc6c246D391E698a82dDf9

Transaction sent: 0x9547506c7b23ad3f1ffff1ff54644036c32d4c67eb2569c1726c6b5c1d16a9a38
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 1
    GameTheoryRewards.claim confirmed (I)  Block: 7  Gas used: 21548 (0.18%)

Transaction sent: 0x69ef3c8e0acade6048fd158e89d392c670776f5a6b3f1be7d865c3cf68fe7578
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 5
    GameTheoryRewards.update confirmed  Block: 8  Gas used: 93851 (0.78%)

Transaction sent: 0xc5c794b7f9071d296f945e12690621fc2e8db34b716ef49436da2471ef43c9f3
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 6
    GameTheoryRewards.depositRewards confirmed  Block: 10  Gas used: 87591 (0.73%)

Transaction sent: 0x88f96f9da07cd3d19e4c5f780c5db0c1013fb2d1ffb31a32aed07ee1d4dc8e52
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 0
    GameTheoryRewards.claim confirmed  Block: 11  Gas used: 147689 (1.23%)

tests/test_rewards.py::test_claim PASSED
tests/test_rewards.py::test_payback_last_claim RUNNING
Transaction sent: 0x8242b7b26dce64d3bac5467c8cda9812e658531517aa98974637fe6752b2f263
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 7
    GameTheoryRewards.constructor confirmed  Block: 12  Gas used: 871611 (7.26%)
      GameTheoryRewards deployed at: 0xcCB53c9429d32594F404d01fbe9E65ED1DCda8D9

Transaction sent: 0x5073893b275eb21994efd69e632c23b13e9057b5b1d834f62814f2cc36611858
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 2
    GameTheoryRewards.paybackLastClaim confirmed (ULK)  Block: 13  Gas used: 24385 (0.20%)

Transaction sent: 0x10e94d91b040516aff347d06fe1172ad9f5ec94be17a89906cf475f142d2ddb0
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 8
    GameTheoryRewards.update confirmed  Block: 14  Gas used: 93851 (0.78%)

Transaction sent: 0x38d65ddbfb8b0535ec1ec76942980c9567582a9cf29e534bbb13c1c90fc510275
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 9
    GameTheoryRewards.depositRewards confirmed  Block: 16  Gas used: 87591 (0.73%)
```

```
tests/test_mullet.py::test_transfer_and_burn RUNNING
Transaction sent: 0x8409164fdb7cd70c7408defc49db7641dd868c8943b4e64d29a5f0b18c5529a5
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 0
    WETH9.constructor confirmed    Block: 1    Gas used: 471464 (3.93%)
    WETH9 deployed at: 0x3194cBDC3dbcd3E11a07892e7bA5c3394048Cc87

Transaction sent: 0xca7331d18bb57baca3b6adelce81818fc3b172c5c075998482367c82a45c9aa6
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 1
    WETH9.deposit confirmed    Block: 2    Gas used: 43769 (0.36%)

Transaction sent: 0x3e6b55b6bb36610e68e49e7742ca50523518ceeb47c2691a986ee8b4b623236a
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 2
    UniswapV3Factory.constructor confirmed    Block: 3    Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xE7eD6747FaC5360f88a2EFC03E00d25789F69291

Transaction sent: 0x38964ac84b705109f7a19e260846a32f0a2b83022a8692f4deb374dfa0f80906
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 3
    SwapRouter.constructor confirmed    Block: 4    Gas used: 1965571 (16.38%)
    SwapRouter deployed at: 0x6951b5Bd815043E3F842c1b026b0Fa888Cc2DD85

Transaction sent: 0x84a5057ece722927cd3205a16e8683e8f577e06ad71c42eeb625046f9f3bf42c
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 4
    ERC20Mock.constructor confirmed    Block: 5    Gas used: 624264 (5.20%)
    ERC20Mock deployed at: 0xe0aA552A10d7EC8760Fc6c246D391E698a82dDf9

Transaction sent: 0x111b99f74fc981730a3c015cc3fe01cfa3fe40093f350d890cb43818cda9a822
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 5
    ERC20Mock.mint confirmed    Block: 6    Gas used: 65606 (0.55%)

Transaction sent: 0x0546780663a1f3703f9ee02951f91c35d65a278be8ddec3c97ac788dcbe022f
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 6
    NFTDescriptor.constructor confirmed    Block: 7    Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0x9E4c14403d7d9A8A782044E86a93CAE09D7B2ac9

Transaction sent: 0xe053f57f3d47f1aa97522cf24358b8e00546846b8b19de9615667f9e0e59b75e
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 7
    NonfungibleTokenPositionDescriptor.constructor confirmed    Block: 8    Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0xcCB53c9429d32594F404d01fbe9E65ED1DCda8D9

Transaction sent: 0xd02fe0e77247dab733ff1dc4fa5fc9f2378a50732ce9fa931f05ee853febe89a
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 8
    NonfungiblePositionManager.constructor confirmed    Block: 9    Gas used: 4431392 (36.93%)
    NonfungiblePositionManager deployed at: 0x420b1099B9eF5bab6D92029594eF45E19A04A4A

Transaction sent: 0xcf467f8f2aleaed1d736519bb921c7fb39794465ef1488781b92f1e76428fb74
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 9
    UniswapV3Liquidity.constructor confirmed    Block: 10    Gas used: 834299 (6.95%)
    UniswapV3Liquidity deployed at: 0xa3B53dDCd2E3fc28e8E130288F2aBD8d5EE37472

Transaction sent: 0xfeacadc383fa78231e08b3ee5bbac640f0f1507b392100ee0666c5eddf0f19d2
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 10
    Mullet.constructor confirmed    Block: 11    Gas used: 5207583 (43.40%)
    Mullet deployed at: 0xb6286fAFd0451320ad6A8143089b216C2152c025

Transaction sent: 0x2fdead448ace281ba8f887479cde133ec53c31cd361c72402e8dc8ce22e0caf
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 11
    NonfungiblePositionManager.createAndInitializePoolIfNecessary confirmed    Block: 12    Gas used: 4520797 (37.67%)

Transaction sent: 0x221cd6d1a54b174025b4060a40cb63f1e41f052fa6e8a3b594e1e4dcef928cb0
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 12
    ERC20Mock.approve confirmed    Block: 13    Gas used: 43943 (0.37%)

Transaction sent: 0x8b608c3265e34bbd430020d2a2170518d23c5a8c88a04e54ad81bfae239fff43
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 13
    WETH9.approve confirmed    Block: 14    Gas used: 44049 (0.37%)

Transaction sent: 0x833d7e7de0edac868c22ec2833clf3f114b75e2a9dd8d15c8f59efaf57e9ec33
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 14
    Mullet.transfer confirmed    Block: 15    Gas used: 124293 (1.04%)

Transaction sent: 0x71e253a8d9386d530b8b797f5e6a6eed725cb0ff0a5cf780b024ce3029e12a71
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 0
    Mullet.transfer confirmed    Block: 16    Gas used: 124281 (1.04%)

Transaction sent: 0x3415fe03b5831512cc3469e77b8b6fdd8fa3cd3db29f977b66de2f97d07f479e
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 16
    Mullet.transfer confirmed    Block: 18    Gas used: 250466 (2.09%)

Transaction sent: 0x6c256953097ea452c6ff7bccee08491b0be5ef4b909fc483f5a46e13aa4af6480
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 0
```

```
tests/test_mullet_deployer.py::test_create_mullet RUNNING
Transaction sent: 0x456e83c5c6bd5bed2d7d64a1497473b3b341a98b7a601c8def27c081ae35e9a9
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 17
    WETH9.constructor confirmed  Block: 20  Gas used: 471464 (3.93%)
    WETH9 deployed at: 0xFbD588c72B438faD4Cf7cD879c8F730Faa213Da0

Transaction sent: 0x7deeb70dcc56ba4f569748c4f2a38d2fd3c3ade41747572a4d29b2a280bfbe5d
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 18
    UniswapV3Factory.constructor confirmed  Block: 21  Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xed00238F9A0F7b4d93842033cdF56cCB32C781c2

Transaction sent: 0x09ddd0f5e3c358f45ded9b7e88f0402fcf6ce868408276ed3b13b271554b2603
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 19
    SwapRouter.constructor confirmed  Block: 22  Gas used: 1965571 (16.38%)
    SwapRouter deployed at: 0xDae02e4fE488952cFB8c95177154D188647a0146

Transaction sent: 0xc92291b61a860690fbebcf6ece7dc285750b5cebf4cd2d019f85d25360eb192
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 20
    NFTDescriptor.constructor confirmed  Block: 23  Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0xdCF93F11ef216cEC9C07fd31dD801c9b2b39Afb4

Transaction sent: 0xf84bf3959c159e9bcf24c292fd376bd63804321cc4caf0e6d82383d609c3c80f
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 21
    NonfungibleTokenPositionDescriptor.constructor confirmed  Block: 24  Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0xBcb61491F1859f53438918F1A5aFCA542Af9D397

Transaction sent: 0xab60c331a4e813761a787a002bbddbe11c2249368440db56ed776396e065e139
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 22
    NonfungiblePositionManager.constructor confirmed  Block: 25  Gas used: 4431392 (36.93%)
    NonfungiblePositionManager deployed at: 0xD22363efee93190f82b52FC62B7Dbcb920eF658

Transaction sent: 0x89b69ae405ab576b661766e50ab9e013b56da20aa392476aca0e37684bec5c9b
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 23
    Mullet.constructor confirmed  Block: 26  Gas used: 5207526 (43.40%)
    Mullet deployed at: 0x4D1B781ce59B8C184F63B99D39d6719A522f46B5

Transaction sent: 0x615eb4081a0f38d58918902d762e66f21f06b977dbfeb2a3624eca308def9362
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 24
    MulletDeployer.constructor confirmed  Block: 27  Gas used: 980311 (8.17%)
    MulletDeployer deployed at: 0xf9C8Cf55f2E520B08d869df7bc76aa3d3ddDF913

Transaction sent: 0xfe142eeba54f6b0daf002f0a7b8b3f7c26954e8fdf73751e6ad91bef6376be1
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 1
    MulletDeployer.createMulletPool confirmed (reverted)  Block: 28  Gas used: 22382 (0.19%)

Transaction sent: 0x9149ffb65785efa99b53d6b54247fd78d3aa8cf37185c729337a6473ff1691e3
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 25
    MulletDeployer.createMulletPool confirmed  Block: 29  Gas used: 4522138 (37.68%)

tests/test_mullet_deployer.py::test_create_mullet PASSED
```

```
tests/test_mullet_deployer.py::test_add_mullet_lp RUNNING
Transaction sent: 0x237fe035c9eadb2c45a89da684178abb72d383e65289b70aabf08905960682ed
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 26
    WETH9.constructor confirmed  Block: 30  Gas used: 471464 (3.93%)
    WETH9 deployed at: 0xADeD61D42dE86f9058386D1D0d739d20C7eAfC43

Transaction sent: 0x53461fce90b77e0ad55c16877f136ef6c3a6cd650ea5e72361781fe4ebe95a86
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 27
    WETH9.deposit confirmed  Block: 31  Gas used: 43769 (0.36%)

Transaction sent: 0x9862ele2a83393e66a109cac711e23acd7806b61a01147f6fcffd94de414af17
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 28
    UniswapV3Factory.constructor confirmed  Block: 32  Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xA95916C3D979400C7443961330b3092510a229Ba

Transaction sent: 0xf0f88543af4be38a18b8ef984ef84bdef8142783295374688a5d0c36e780ecf2
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 29
    SwapRouter.constructor confirmed  Block: 33  Gas used: 1965583 (16.38%)
    SwapRouter deployed at: 0x42E8D004c84E6B5Bad559D3b5CE7947AADb9E0bc

Transaction sent: 0xff3dfdbfe4f8ff98321f5d31fb93945db784d0aaffceadc85c956e86dbfa6cdb
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 30
    NFTDescriptor.constructor confirmed  Block: 34  Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0xF06D5f5BfFFCB6a52c84cfecb03AD35637728E73

Transaction sent: 0x59107c2c1dac9ad1329334ed973013903ecf3f97cdade404ff137800d68b2413
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 31
    NonfungibleTokenPositionDescriptor.constructor confirmed  Block: 35  Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0x82c83b7f88aef2eD99d4869D547b6ED28e69C8df

Transaction sent: 0x6a17ce79fa0b60f39dfb71070645e26df9982ba4b90f293f8c7a5d3829e1f185
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 32
    NonfungiblePositionManager.constructor confirmed  Block: 36  Gas used: 4431404 (36.93%)
    NonfungiblePositionManager deployed at: 0x724Ca58E1e6e64BFB1E15d7Eec0fe1E5f581c7bD

Transaction sent: 0xb73dc6e790a09213317840c4a35529ef31bd80cac920547d50788c51a0a5d8a4
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 33
    Mullet.constructor confirmed  Block: 37  Gas used: 5207538 (43.40%)
    Mullet deployed at: 0x34b97ffa01dc0DC959c5f1176273D0de3be914C1

Transaction sent: 0xfc378da77d3e2d8effc511c06940997603bf1a04d14649a2091470b4d464a08a
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 34
    MulletDeployer.constructor confirmed  Block: 38  Gas used: 980323 (8.17%)
    MulletDeployer deployed at: 0xc830Ad2FDfCC2f368fE5DeC93b1Dc72ecABb3691

Transaction sent: 0x0714a43f63526b1a2d405de1635c3b906e8bd09aadb8a2e79d2fcf7c4d93ed78
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 35
    MulletDeployer.createMulletPool confirmed  Block: 39  Gas used: 4522138 (37.68%)

Transaction sent: 0x56474050057eb7b4767134b94d18f847452fac51b2ecbc0db218af2e57774193
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 2
    MulletDeployer.addMulletLp confirmed (reverted)  Block: 40  Gas used: 22170 (0.18%)

tests/test_mullet_deployer.py::test_add_mullet_lp PASSED
```

## Mullet contracts tests [v2]:

```
tests/test_mullet.py::test_transfer_and_burn RUNNING
Transaction sent: 0x8409164fdb7cd70c7408defc49db7641dd868c8943b4e64d29a5f0b18c5529a5
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 0
    WETH9.constructor confirmed  Block: 1  Gas used: 471464 (3.93%)
    WETH9 deployed at: 0x3194cBDC3dbcd3E11a07892e7bA5c3394048Cc87

Transaction sent: 0xca7331d18bb57bac3b6adelce81818fc3b172c5c075998482367c82a45c9aa6
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 1
    WETH9.deposit confirmed  Block: 2  Gas used: 43769 (0.36%)

Transaction sent: 0x3e6b55b6bb36610e68e49e7742ca50523518ceeb47c2691a986ee8b4b623236a
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 2
    UniswapV3Factory.constructor confirmed  Block: 3  Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xE7eD6747FaC5360f88a2EFC03E00d25789F69291

Transaction sent: 0x38964ac84b705109f7a19e260846a32f0a2b83022a8692f4deb374dfa0f80906
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 3
    SwapRouter.constructor confirmed  Block: 4  Gas used: 1965571 (16.38%)
    SwapRouter deployed at: 0x6951b5Bd815043E3F842c1b026b0Fa888Cc2DD85

Transaction sent: 0x84a5057ece722927cd3205a16e8683e8f577e06ad71c42eeb625046f9f3bf42c
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 4
    ERC20Mock.constructor confirmed  Block: 5  Gas used: 624264 (5.20%)
    ERC20Mock deployed at: 0xe0aA552A10d7EC8760Fc6c246D391E698a82dDf9

Transaction sent: 0x111b99f74fc981730a3c015cc3fe01cfa3fe40093f350d890cb43818cda9a822
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 5
    ERC20Mock.mint confirmed  Block: 6  Gas used: 65606 (0.55%)

Transaction sent: 0x0546780663a1f3703f9ee02951f91c35d65a278be8ddec3c97ac788dcbe022f
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 6
    NFTDescriptor.constructor confirmed  Block: 7  Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0x9E4c14403d7d9A8A782044E86a93CAE09D7B2ac9

Transaction sent: 0xe053f57f3d47f1aa97522cf24358b8e00546846b8b19de9615667f9e0e59b75e
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 7
    NonfungibleTokenPositionDescriptor.constructor confirmed  Block: 8  Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0xCB53c9429d32594F404d01fbe9E65ED1DCda8D9

Transaction sent: 0xd02fe0e77247dab733ff1dc4fa5fc9f2378a50732ce9fa931f05ee853febe89a
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 8
    NonfungiblePositionManager.constructor confirmed  Block: 9  Gas used: 4431392 (36.93%)
    NonfungiblePositionManager deployed at: 0x420b1099B9eF5babba6D92029594eF45E19A04A4A

Transaction sent: 0xcf467f8f2aleaed1d736519bb921c7fb39794465ef1488781b92f1e76428fb74
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 9
    UniswapV3Liquidity.constructor confirmed  Block: 10  Gas used: 834299 (6.95%)
    UniswapV3Liquidity deployed at: 0xa3B53dDCd2E3fC28e8E130288F2aBD8d5EE37472

Transaction sent: 0x61b2fcf4c312af3bb7544e171074b5548425f98c638c9d9a394c00a4f373288c
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 10
    Mullet.constructor confirmed  Block: 11  Gas used: 5593417 (46.61%)
    Mullet deployed at: 0xb6286fAFd0451320ad6A8143089b216C2152c025

Transaction sent: 0x2fdead448ace281ba8f887479cde133ec53c31cd361c72402e8dc8ce22e0caf
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 11
    NonfungiblePositionManager.createAndInitializePoolIfNecessary confirmed  Block: 12  Gas used: 4520797 (37.67%)

Transaction sent: 0x221cd6d1a54b174025b4060a40cb63f1e41f052fa6e8a3b594e1e4dcef928cb0
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 12
    ERC20Mock.approve confirmed  Block: 13  Gas used: 43943 (0.37%)

Transaction sent: 0x8b608c3265e34bbd430020d2a2170518d23c5a8c88a04e54ad81bfae239fff43
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 13
    WETH9.approve confirmed  Block: 14  Gas used: 44049 (0.37%)

Transaction sent: 0x833d7e7de0edac868c22ec2833c1f3f114b75e2a9dd8d15c8f59efaf57e9ec33
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 14
    Mullet.transfer confirmed  Block: 15  Gas used: 124315 (1.04%)

Transaction sent: 0x71e253a8d9386d530b8b797f5e6a6eed725cb0ff0a5cf780b024ce3029e12a71
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 0
    Mullet.transfer confirmed  Block: 16  Gas used: 124303 (1.04%)

Transaction sent: 0x3415fe03b5831512cc3469e77b8b6fd8fa3cd3db29f977b66de2f97d07f479e
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 16
    Mullet.transfer confirmed  Block: 18  Gas used: 250488 (2.09%)

Transaction sent: 0x6c256953097ea452c6ff7bcee08491b0be5ef4b909fc483f5a46e13aa4af6480
  Gas price: 0.0 gwei  Gas limit: 12000000 Nonce: 0
    Mullet.burn confirmed  Block: 19  Gas used: 69559 (0.58%)

tests/test_mullet.py::test_transfer_and_burn PASSED
```

```
tests/test_mullet_deployer.py::test_create_mullet RUNNING
Transaction sent: 0x456e83c5c6bd5bed2d7d64a1497473b3b341a98b7a601c8def27c081ae35e9a9
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 17
    WETH9.constructor confirmed  Block: 20  Gas used: 471464 (3.93%)
    WETH9 deployed at: 0xFbD588c72B438faD4Cf7cD879c8F730Faa213Da0

Transaction sent: 0x7deeb70dcc56ba4f569748c4f2a38d2fd3c3ade41747572a4d29b2a280bfbe5d
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 18
    UniswapV3Factory.constructor confirmed  Block: 21  Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xed00238F9A0F7b4d93842033cdF56cCB32C781c2

Transaction sent: 0x09ddd0f5e3c358f45ded9b7e88f0402fcf6ce868408276ed3b13b271554b2603
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 19
    SwapRouter.constructor confirmed  Block: 22  Gas used: 1965571 (16.38%)
    SwapRouter deployed at: 0xDae02e4fE488952cFB8c95177154D188647a0146

Transaction sent: 0xc92291b61a860690fbebcf6ece7dc285750b5cebf4cd2d019f85d25360eb192
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 20
    NFTDescriptor.constructor confirmed  Block: 23  Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0xdCF93F11ef216cEC9C07fd31dD801c9b2b39Afb4

Transaction sent: 0xf84bf3959c159e9bcf24c292fd376bd63804321cc4caf0e6d82383d609c3c80f
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 21
    NonfungibleTokenPositionDescriptor.constructor confirmed  Block: 24  Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0xBcb61491F1859f53438918F1A5aFCA542Af9D397

Transaction sent: 0xab60c331a4e813761a787a002bbddbe11c2249368440db56ed776396e065e139
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 22
    NonfungiblePositionManager.constructor confirmed  Block: 25  Gas used: 4431392 (36.93%)
    NonfungiblePositionManager deployed at: 0xD22363efee93190f82b52FC62B7Dbcb920eF658

Transaction sent: 0x52baa22f157e5abff8aab5b7d606ac3fc24c1c7124d6795695669fb80031c80
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 23
    Mullet.constructor confirmed  Block: 26  Gas used: 5593360 (46.61%)
    Mullet deployed at: 0x4D1B781ce59B8C184F63B99D39d6719A522f46B5

Transaction sent: 0x615eb4081a0f38d58918902d762e66f21f06b977dbfeb2a3624eca308def9362
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 24
    MulletDeployer.constructor confirmed  Block: 27  Gas used: 980311 (8.17%)
    MulletDeployer deployed at: 0xf9C8Cf55f2E520B08d869df7bc76aa3d3ddDF913

Transaction sent: 0xfe142eeba54f6b0daf0e02f0a7b8b3f7c26954e8fdf73751e6ad91bef6376bel
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 1
    MulletDeployer.createMulletPool confirmed (reverted)  Block: 28  Gas used: 22382 (0.19%)

Transaction sent: 0x9149ffb65785efa99b53d6b54247fd78d3aa8cf37185c729337a6473ff1691e3
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 25
    MulletDeployer.createMulletPool confirmed  Block: 29  Gas used: 4522138 (37.68%)

tests/test_mullet_deployer.py::test_create_mullet PASSED
```

```
tests/test_mullet_deployer.py::test_add_mullet_lp RUNNING
Transaction sent: 0x237fe035c9eadb2c45a89da684178abb72d383e65289b70aabf08905960682ed
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 26
    WETH9.constructor confirmed  Block: 30  Gas used: 471464 (3.93%)
    WETH9 deployed at: 0xADeD61D42dE86f9058386D1D0d739d20C7eAfC43

Transaction sent: 0x53461fce90b77e0ad55c16877f136ef6c3a6cd650ea5e72361781fe4ebe95a86
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 27
    WETH9.deposit confirmed  Block: 31  Gas used: 43769 (0.36%)

Transaction sent: 0x9862e1e2a83393e66a109cac711e23acd7806b61a01147f6fcffd94de414af17
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 28
    UniswapV3Factory.constructor confirmed  Block: 32  Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xA95916C3D979400C7443961330b3092510a229Ba

Transaction sent: 0xf0f88543af4be38a18b8ef984ef84bdef8142783295374688a5d0c36e780ecf2
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 29
    SwapRouter.constructor confirmed  Block: 33  Gas used: 1965583 (16.38%)
    SwapRouter deployed at: 0x42E8D004c84E6B5Bad559D3b5CE7947AADb9E0bc

Transaction sent: 0xff3dfdbfe4f8ff98321f5d31fb93945db784d0aaffceadc85c956e86dbfa6cdb
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 30
    NFTDescriptor.constructor confirmed  Block: 34  Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0xF06D5f5BfFFCB6a52c84cfebc03AD35637728E73

Transaction sent: 0x59107c21dac9ad1329334ed973013903ecf3f97cdade404ff137800d68b2413
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 31
    NonfungibleTokenPositionDescriptor.constructor confirmed  Block: 35  Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0x82c83b7f88aef2eD99d4869D547b6ED28e69C8df

Transaction sent: 0x6a17ce79fa0b60f39dfb71070645e26df9982ba4b90f293f8c7a5d3829e1f185
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 32
    NonfungiblePositionManager.constructor confirmed  Block: 36  Gas used: 4431404 (36.93%)
    NonfungiblePositionManager deployed at: 0x724Ca58E1e6e64BFB1E15d7Eec0fe1E5f581c7bD

Transaction sent: 0xb7732fb1e3732f3f649ba96741c2ee32271a871504ca36ede6a367a6b51fcdb
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 33
    Mullet.constructor confirmed  Block: 37  Gas used: 5593372 (46.61%)
    Mullet deployed at: 0x34b97ffa01dc0DC959c5f1176273D0de3be914C1

Transaction sent: 0xfc378da77d3e2d8effc511c06940997603bf1a04d14649a2091470b4d464a08a
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 34
    MulletDeployer.constructor confirmed  Block: 38  Gas used: 980323 (8.17%)
    MulletDeployer deployed at: 0xc830Ad2FDfCC2f368fE5DeC93b1Dc72ecABb3691

Transaction sent: 0x0714a43f63526b1a2d405de1635c3b906e8bd09aadb8a2e79d2fcf7c4d93ed78
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 35
    MulletDeployer.createMulletPool confirmed  Block: 39  Gas used: 4522138 (37.68%)

Transaction sent: 0x56474050057eb7b4767134b94d18f847452fac51b2ecbc0db218af2e57774193
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 2
    MulletDeployer.addMulletLp confirmed (reverted)  Block: 40  Gas used: 22170 (0.18%)

tests/test_mullet_deployer.py::test_add_mullet_lp PASSED
```

```
tests/test_rewards.py::test_update RUNNING
Transaction sent: 0xb53b27787ec21814ecc5b85857d20462c13b6c74dc0c3da2957e38bcf6048ca9
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 36
    GameTheoryRewards.constructor confirmed  Block: 41  Gas used: 1080783 (9.01%)
    GameTheoryRewards deployed at: 0x741e3E1f81041c62C2A97d0b6E567AcaB09A6232

Transaction sent: 0x95877ae2b899e39a08858e62affec8b6e8edce717b71f6f7ff48a28d3183ff11
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 3
    GameTheoryRewards.update confirmed (T)  Block: 42  Gas used: 21976 (0.18%)

Transaction sent: 0x0969ca996fc6255e529c4b6597fe609aab360e6c7275d21a4e1b38485232abcd
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 37
    GameTheoryRewards.update confirmed  Block: 43  Gas used: 93851 (0.78%)

Transaction sent: 0x42caf4abc2458771456895d68173ea81b25df329312c346ced2bbb30d23f7d6b
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 38
    GameTheoryRewards.update confirmed (R)  Block: 44  Gas used: 23262 (0.19%)

Transaction sent: 0xb6cfdda88f6a2f773974a9017542f068f69bdb21d589746b8ff6ada350f1b6e0
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 39
    GameTheoryRewards.update confirmed  Block: 45  Gas used: 25870 (0.22%)

tests/test_rewards.py::test_update PASSED
tests/test_rewards.py::test_claim RUNNING
Transaction sent: 0x7b166052c9278a64f14c0cd5a58c0fa42b38c84fdd79b4d6a354313acd7e7704
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 40
    GameTheoryRewards.constructor confirmed  Block: 46  Gas used: 1080783 (9.01%)
    GameTheoryRewards deployed at: 0x0AC45e945A008D3fc19da8f591be8601C1F63130

Transaction sent: 0x2c0148feb786fdb0618a600449ea572cbc854265b8523681417ac52167f21454
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 4
    GameTheoryRewards.claim confirmed (I)  Block: 47  Gas used: 22086 (0.18%)

Transaction sent: 0x3469ea74c318ba02704f3de7b00819f3ec6176b41c69bd11378d53db4cf306b4
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 41
    GameTheoryRewards.update confirmed  Block: 48  Gas used: 93851 (0.78%)

Transaction sent: 0x8293a252bb48e88d6efb52beeaa52bb58859dd58ff3081dd3ace63ea2a74818ff2
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 42
    GameTheoryRewards.depositRewards confirmed  Block: 50  Gas used: 87591 (0.73%)

Transaction sent: 0x3ead1350777c5db089fb4e3ea32728e72d5ca4e16379a8d72b48c42ef92ff279
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 1
    GameTheoryRewards.claim confirmed  Block: 51  Gas used: 148319 (1.24%)

tests/test_rewards.py::test_claim PASSED
tests/test_rewards.py::test_payback_last_claim RUNNING
Transaction sent: 0x6627ba8d9da4bcbf4a08c926ceaa7e2b44db1370a9eccaa2a67afb150c3e20222
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 43
    GameTheoryRewards.constructor confirmed  Block: 52  Gas used: 1080783 (9.01%)
    GameTheoryRewards deployed at: 0x0e19E87b363DD7a3af5c45C95ab6885367251B94

Transaction sent: 0xfa670dd0f6b78dcfd9348b48576cd46212721ef26cc0276a422e6d3ccfe67c92
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 5
    GameTheoryRewards.paybackLastClaim confirmed (ULK)  Block: 53  Gas used: 24363 (0.20%)

Transaction sent: 0x17c5d5ac1343005e46f83edbfa15cd2c366e06400421149b8525e10227c3baac
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 44
    GameTheoryRewards.update confirmed  Block: 54  Gas used: 93851 (0.78%)

Transaction sent: 0xc28fe1381bc21eb4d65ae51df066c29b679f50ca8dd248b31b6409e49575c130
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 45
    GameTheoryRewards.depositRewards confirmed  Block: 56  Gas used: 87591 (0.73%)

Transaction sent: 0x2780d2962d92d9a2a15fd44ad9f1f797ee0c20da0bfbf34a3e488e6ff09b7074
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 2
    GameTheoryRewards.claim confirmed  Block: 57  Gas used: 148319 (1.24%)

Transaction sent: 0x5a9b8696eb1145c1b225d6de6a966936b5f0248130c0cf41f3721f3212c65f50
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 3
    GameTheoryRewards.paybackLastClaim confirmed (E)  Block: 58  Gas used: 27970 (0.23%)

Transaction sent: 0x8ed4cb0bc4cc6340bdc0701981932d6bee44d25a3215ef4a1daf3107b68786c2
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 4
    GameTheoryRewards.paybackLastClaim confirmed  Block: 59  Gas used: 34747 (0.29%)

tests/test_rewards.py::test_payback_last_claim PASSED
```

**Mullet contracts tests [v3]:**

```
tests/test_mullet.py::test_transfer_and_burn RUNNING
Transaction sent: 0x8409164fdb7cd70c7408defc49db7641dd868c8943b4e64d29a5f0b18c5529a5
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 0
    WETH9.constructor confirmed    Block: 1    Gas used: 471464 (3.93%)
    WETH9 deployed at: 0x3194cBDC3dbcd3E11a07892e7bA5c3394048Cc87

Transaction sent: 0xca7331d18bb57baca3b6ade1ce81818fc3b172c5c075998482367c82a45c9aa6
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 1
    WETH9.deposit confirmed    Block: 2    Gas used: 43769 (0.36%)

Transaction sent: 0x3e6b55b6bb36610e68e49e7742ca50523518ceeb47c2691a986ee8b4b623236a
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 2
    UniswapV3Factory.constructor confirmed    Block: 3    Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xE7eD6747FaC5360f88a2EFC03E00d25789F69291

Transaction sent: 0x38964ac84b705109f7a19e260846a32f0a2b83022a8692f4deb374dfa0f80906
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 3
    SwapRouter.constructor confirmed    Block: 4    Gas used: 1965571 (16.38%)
    SwapRouter deployed at: 0x6951b5Bd815043E3F842c1b026b0Fa888Cc2DD85

Transaction sent: 0x84a5057ece722927cd3205a16e8683e8f577e06ad71c42eeb625046f9f3bf42c
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 4
    ERC20Mock.constructor confirmed    Block: 5    Gas used: 624264 (5.20%)
    ERC20Mock deployed at: 0xe0aA552A10d7EC8760Fc6c246D391E698a82dDf9

Transaction sent: 0x111b99f74fc981730a3c015cc3fe01cfa3fe40093f350d890cb43818cda9a822
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 5
    ERC20Mock.mint confirmed    Block: 6    Gas used: 65606 (0.55%)

Transaction sent: 0x0546780663a1f3703f9ee02951f91c35d65a278be8ddec3c97ac788dcbe022f
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 6
    NFTDescriptor.constructor confirmed    Block: 7    Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0x9E4c14403d7d9A8A782044E86a93CAE09D7B2ac9

Transaction sent: 0xe053f57f3d47f1aa97522cf24358b8e00546846b8b19de9615667f9e0e59b75e
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 7
    NonfungibleTokenPositionDescriptor.constructor confirmed    Block: 8    Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0xcCB53c9429d32594F404d01fbe9E65ED1DCda8D9

Transaction sent: 0xd02fe0e77247dab733ff1dc4fa5fc9f2378a50732ce9fa931f05ee853febe89a
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 8
    NonfungiblePositionManager.constructor confirmed    Block: 9    Gas used: 4431392 (36.93%)
    NonfungiblePositionManager deployed at: 0x420b1099B9eF5bab6D92029594eF45E19A04A4A

Transaction sent: 0xfc467f8f2aleaed1d736519bb921c7fb39794465ef1488781b92f1e76428fb74
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 9
    UniswapV3Liquidity.constructor confirmed    Block: 10    Gas used: 834299 (6.95%)
    UniswapV3Liquidity deployed at: 0xa3B53dDCd2E3fc28e8E130288F2aBD8d5EE37472

Transaction sent: 0x9489033e7c41laee667ec0e4f7b1690d07980a2707d9bf78e28f3a922f5e7f79
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 10
    Mullet.constructor confirmed    Block: 11    Gas used: 5977812 (49.82%)
    Mullet deployed at: 0xb6286fAFd0451320ad6A8143089b216C2152c025

Transaction sent: 0x2fdead448ace281ba8f887479cde133ec53c31cd361c72402e8dc8ce22e0caf
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 11
    NonfungiblePositionManager.createAndInitializePoolIfNecessary confirmed    Block: 12    Gas used: 4520797 (37.67%)

Transaction sent: 0x221cd6d1a54b174025b4060a40cb63f1e41f052fa6e8a3b594e1e4dcef928cb0
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 12
    ERC20Mock.approve confirmed    Block: 13    Gas used: 43943 (0.37%)

Transaction sent: 0x8b608c3265e34bbd430020d2a2170518d23c5a8c88a04e54ad81bfae239fff43
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 13
    WETH9.approve confirmed    Block: 14    Gas used: 44049 (0.37%)

Transaction sent: 0x833d7e7de0edac868c22ec2833c1f3f114b75e2a9dd8d15c8f59efaf57e9ec33
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 14
    Mullet.transfer confirmed    Block: 15    Gas used: 126886 (1.06%)

Transaction sent: 0x71e253a8d9386d530b8b797f5e6a6eed725cb0ff0a5cf780b024ce3029e12a71
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 0
    Mullet.transfer confirmed    Block: 16    Gas used: 126874 (1.06%)

Transaction sent: 0x3415fe03b5831512cc3469e77b8b6fdd8fa3cd3db29f977b66de2f97d07f479e
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 16
    Mullet.transfer confirmed    Block: 18    Gas used: 250536 (2.09%)

Transaction sent: 0x6c256953097ea452c6ff7bcee08491b0be5ef4b909fc483f5a46e13aa4af6480
    Gas price: 0.0 gwei    Gas limit: 12000000    Nonce: 0
```

```
tests/test_mullet_deployer.py::test_create_mullet RUNNING
Transaction sent: 0x456e83c5c6bd5bed2d7d64a1497473b3b341a98b7a601c8def27c081ae35e9a9
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 17
    WETH9.constructor confirmed  Block: 21  Gas used: 471464 (3.93%)
    WETH9 deployed at: 0xFbD588c72B438faD4Cf7cD879c8F730Faa213Da0

Transaction sent: 0x7deeb70dcc56ba4f569748c4f2a38d2fd3c3ade41747572a4d29b2a280bfbe5d
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 18
    UniswapV3Factory.constructor confirmed  Block: 22  Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xed00238F9A0F7b4d93842033cdF56cCB32C781c2

Transaction sent: 0x09ddd0f5e3c358f45ded9b7e88f0402fcf6ce868408276ed3b13b271554b2603
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 19
    SwapRouter.constructor confirmed  Block: 23  Gas used: 1965571 (16.38%)
    SwapRouter deployed at: 0xDae02e4fE488952cFB8c95177154D188647a0146

Transaction sent: 0xc92291b61a860690fbebcf6ece7dcb285750b5cebf4cd2d019f85d25360eb192
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 20
    NFTDescriptor.constructor confirmed  Block: 24  Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0xdCF93F11ef216cEC9C07fd31dD801c9b2b39Afb4

Transaction sent: 0xf84bf3959c159e9bcf24c292fd376bd63804321cc4caf0e6d82383d609c3c80f
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 21
    NonfungibleTokenPositionDescriptor.constructor confirmed  Block: 25  Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0xBcb61491F1859f53438918F1A5aFCA542Af9D397

Transaction sent: 0xab60c331a4e813761a787a002bbddbe11c2249368440db56ed776396e065e139
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 22
    NonfungiblePositionManager.constructor confirmed  Block: 26  Gas used: 4431392 (36.93%)
    NonfungiblePositionManager deployed at: 0xD22363efee93190f82b52FCD62B7Dbcb920eF658

Transaction sent: 0x6744ca02275800f54854d6752d7bc396a81c88d46b1c1d6b74fdd8b44fa29363
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 23
    Mullet.constructor confirmed  Block: 27  Gas used: 5977755 (49.81%)
    Mullet deployed at: 0x4D1B781ce59B8C184F63B99D39d6719A522f46B5

Transaction sent: 0x539c586a8a9b99c76e49b71e2f2e7dbe3950d9cbb99c580c191ea834741c80c0
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 24
    MulletDeployer.constructor confirmed  Block: 28  Gas used: 1140982 (9.51%)
    MulletDeployer deployed at: 0xf9C8Cf55f2E520B08d869df7bc76aa3d3ddDF913

Transaction sent: 0xfe142eeba54f6b0daf002f0a7b8b3f7c26954e8fdf73751e6ad91bef6376bel
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 1
    MulletDeployer.createMulletPool confirmed (reverted)  Block: 29  Gas used: 22382 (0.19%)

Transaction sent: 0x9149ffb65785efa99b53d6b54247fd78d3aa8cf37185c729337a6473ff1691e3
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 25
    MulletDeployer.createMulletPool confirmed  Block: 30  Gas used: 4522138 (37.68%)

tests/test_mullet_deployer.py::test_create_mullet PASSED
```

```
tests/test_mullet_deployer.py::test_add_mullet_lp RUNNING
Transaction sent: 0x237fe035c9eadb2c45a89da684178abb72d383e65289b70aabf08905960682ed
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 26
    WETH9.constructor confirmed  Block: 31  Gas used: 471464 (3.93%)
    WETH9 deployed at: 0xADeD61D42dE86f9058386D1D0d739d20C7eAfc43

Transaction sent: 0x53461fce90b77e0ad55c16877f136ef6c3a6cd650ea5e72361781fe4ebe95a86
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 27
    WETH9.deposit confirmed  Block: 32  Gas used: 43769 (0.36%)

Transaction sent: 0x9862e1e2a83393e66a109cac711e23acd7806b61a01147f6fcffd94de414af17
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 28
    UniswapV3Factory.constructor confirmed  Block: 33  Gas used: 5421573 (45.18%)
    UniswapV3Factory deployed at: 0xA95916C3D979400C7443961330b3092510a229Ba

Transaction sent: 0xf0f88543af4be38a18b8ef984ef84bdef8142783295374688a5d0c36e780ecf2
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 29
    SwapRouter.constructor confirmed  Block: 34  Gas used: 1965583 (16.38%)
    SwapRouter deployed at: 0x42E8D004c84E6B5Bad559D3b5CE7947AADb9E0bc

Transaction sent: 0xff3dfdbfe4f8ff98321f5d31fb93945db784d0aaffceadc85c956e86dbfa6cdb
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 30
    NFTDescriptor.constructor confirmed  Block: 35  Gas used: 4627980 (38.57%)
    NFTDescriptor deployed at: 0xF06D5f5BfFFCB6a52c84cfecb03AD35637728E73

Transaction sent: 0x59107c2c1dac9ad1329334ed973013903ecf3f97cdade404ff137800d68b2413
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 31
    NonfungibleTokenPositionDescriptor.constructor confirmed  Block: 36  Gas used: 938430 (7.82%)
    NonfungibleTokenPositionDescriptor deployed at: 0x82c83b7f88aeef2eD99d4869D547b6ED28e69C8df

Transaction sent: 0x6a17ce79fa0b60f39dfb71070645e26df9982ba4b90f293f8c7a5d3829e1f185
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 32
    NonfungiblePositionManager.constructor confirmed  Block: 37  Gas used: 4431404 (36.93%)
    NonfungiblePositionManager deployed at: 0x724Ca58E1e6e64BFB1E15d7Eec0fe1E5f581c7bD

Transaction sent: 0x4a4512dcaaf34c64762fa4659499a865f3a7db68d73842b01c790c67ed88fd9e
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 33
    Mullet.constructor confirmed  Block: 38  Gas used: 5977767 (49.81%)
    Mullet deployed at: 0x34b97ffa01dc0DC959c5f1176273D0de3be914C1

Transaction sent: 0x2d3cd690e6533edb2d66b88e1f58ccdc4a39d81bc02cd2deff0568f71b1cc2f3
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 34
    MulletDeployer.constructor confirmed  Block: 39  Gas used: 1140994 (9.51%)
    MulletDeployer deployed at: 0xc830Ad2FDfCC2f368fE5DeC93b1Dc72ecABb3691

Transaction sent: 0x0714a43f63526b1a2d405de1635c3b906e8bd09aadb8a2e79d2fcf7c4d93ed78
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 35
    MulletDeployer.createMulletPool confirmed  Block: 40  Gas used: 4522138 (37.68%)

Transaction sent: 0x6319ce82b2ee1b47fe574a9ff78d1c253d0e20cd6ee5d770c680f69c144df017
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 2
    MulletDeployer.addMulletLp confirmed (reverted)  Block: 41  Gas used: 23553 (0.20%)

Transaction sent: 0xc970a9fb71c4faed840b5d3bdbc21ae6823f8ad7c2e8a86ef167aeb2f3817d5
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 36
    MulletDeployer.addMulletLp confirmed (M)  Block: 42  Gas used: 23673 (0.20%)

tests/test_mullet_deployer.py::test_add_mullet_lp PASSED
```

```
tests/test_rewards.py::test_update RUNNING
Transaction sent: 0xb08428ca7e62450d6177c75f5ebef32d2ea2cb78ad0b4fb9bd9daf088160cf9
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 37
    GameTheoryRewards.constructor confirmed  Block: 43  Gas used: 1082283 (9.02%)
      GameTheoryRewards deployed at: 0x4B0FccF53589c1F185B35db88bB315a0bBF9a3e0

Transaction sent: 0x2cb56b5f5b2cd3213aee15d58bb4517573472eece021caa47d7c46e0fbad22d
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 3
    GameTheoryRewards.update confirmed (T)  Block: 44  Gas used: 21976 (0.18%)

Transaction sent: 0x7f7f85af585c1c8e4859a40b8e4ecb303cc3220a3860e887d3afaddc0a1c28b4
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 38
    GameTheoryRewards.update confirmed  Block: 45  Gas used: 93851 (0.78%)

Transaction sent: 0xc0dde45bc5645099c536d3d070df2564f00fa15c37698153dfc12b5bbf49ae28
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 39
    GameTheoryRewards.update confirmed (R)  Block: 46  Gas used: 23206 (0.19%)

Transaction sent: 0xf5ffa2d24d3deb0771143f8679e192e9bdd8fc3dc6e1df439cd1de8729f00d9
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 40
    GameTheoryRewards.update confirmed  Block: 47  Gas used: 27141 (0.23%)

tests/test_rewards.py::test_update PASSED
tests/test_rewards.py::test_claim RUNNING
Transaction sent: 0x267493446815842e9fb3ed62a9e9eb50974027aad34a6493b3673cdf1fdfe511
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 41
    GameTheoryRewards.constructor confirmed  Block: 48  Gas used: 1082283 (9.02%)
      GameTheoryRewards deployed at: 0x5847798CE8c89e3Fff59AE5fA30BEC0d406b5687

Transaction sent: 0x9ca0d25e75d1e8cb0d6e7b7f27a1e2b5b81ce2243eae4fd54e4a6ed17e8e9996
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 4
    GameTheoryRewards.claim confirmed (I)  Block: 49  Gas used: 22086 (0.18%)

Transaction sent: 0x6576c7893bbf0371218c52552fd4c44cc042730ec9e723052c0270131a151fad
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 42
    GameTheoryRewards.update confirmed  Block: 50  Gas used: 93851 (0.78%)

Transaction sent: 0xbcb2ce8f9af2f99234682e9d44eec2b47f12d951930c97c63dd075a03d6f88fe
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 43
    GameTheoryRewards.depositRewards confirmed  Block: 52  Gas used: 87591 (0.73%)

Transaction sent: 0x5aa5682e057e1597ccf83a1b0ccde2bbde8d92d3c1eeacec304b89996c50aae6
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 2
    GameTheoryRewards.claim confirmed  Block: 53  Gas used: 148319 (1.24%)

tests/test_rewards.py::test_claim PASSED
tests/test_rewards.py::test_payback_last_claim RUNNING
Transaction sent: 0x6f3cb2a1e31d71753b389d03692d76af88f7a53509ddf79a5bea3e38083e0e58
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 44
    GameTheoryRewards.constructor confirmed  Block: 54  Gas used: 1082283 (9.02%)
      GameTheoryRewards deployed at: 0xaA7e46855e0506401214c9b1C35f3d889669609e

Transaction sent: 0x814939a3d4d674f6587de1dd8747a047b74575e4fed41ef981870fc4b7c41ee
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 5
    GameTheoryRewards.paybackLastClaim confirmed (ULK)  Block: 55  Gas used: 24363 (0.20%)

Transaction sent: 0xf7cdf97ce3c256bf1891fc8ef1b66d9e7a9b9a68d093dd115940af5ed6e227f
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 45
    GameTheoryRewards.update confirmed  Block: 56  Gas used: 93851 (0.78%)

Transaction sent: 0x586933f9e2ffe436066f353c837033552954e7a3ef56d0215029b0da958b70c8
  Gas price: 0.0 gwei  Gas limit: 12000000  Nonce: 46
    GameTheoryRewards.depositRewards confirmed  Block: 58  Gas used: 87591 (0.73%)
```

# Annexes

Testing code:

Testing\_Mullet.py:

```
from brownie import (
    reverts,
)

from scripts.helpful_scripts import (
    ZERO_ADDRESS,
    get_account,
    calculate_sqrt_price_x96
)

from scripts.deploy import (
    deploy_erc,
    deploy_mullet,
    # dependencies
    deploy_weth,
    deploy_uniswap_v3_factory,
    deploy_swap_router,
    deploy_position_manager,
    deploy_position_descriptor,
    deploy_uniswap_v3_liquidity
)

def test_transfer_and_burn(only_local):
    # Arrange
```

```

owner = get_account(0)

other = get_account(1)

extra = get_account(2)

random_endpoint = get_account(3)

# Deployment weth, router and factory

weth = deploy_weth(owner)

weth.deposit({"from": owner, "value": 10e18})

factory = deploy_uniswap_v3_factory(owner)

router = deploy_swap_router(owner, factory.address, weth.address)

# Deploy mock token

liquidity_token = deploy_erc(owner, "Liquidity", "LIQ")

liquidity_token.mint(owner, 100000e18)

# Deploy PositionManager

label = 0x4c4142454c

position_descriptor = deploy_position_descriptor(owner, weth.address, label)

position_manager = deploy_position_manager(owner, factory.address, weth.address,
position_descriptor.address)

# Uniswap V3 Liquidity

liquidity = deploy_uniswap_v3_liquidity(owner, weth.address, liquidity_token.address,
position_manager.address)

mullet = deploy_mullet(
    owner, weth.address, position_manager.address,
    factory.address, router.address, random_endpoint
)

```

```

# Create and initialize pool

fee = 500

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000) # 10000 LIQ - 1
wETH

tx = position_manager.createAndInitializePoolIfNecessary(
    weth.address, liquidity_token.address,
    fee, sqrt_price_X96, {"from": owner})

pool = tx.events['PoolCreated'][0]['pool']

tick_spacing = tx.events['PoolCreated'][0]['tickSpacing']

tick = tx.events['Initialize'][0]['tick']

# Mint

liquidity_token.approve(liquidity.address, 10000e18, {"from": owner})
weth.approve(liquidity.address, 1e18, {"from": owner})


tx = mullet.transfer(other, 5e18, {"from": owner})

assert tx.events['Transfer'][0]['from'] == owner
assert tx.events['Transfer'][0]['to'] == other
assert tx.events['Transfer'][0]['value'] == 5e18
assert tx.events['RemoveShares'][0]['user'] == owner
assert tx.events['RemoveShares'][0]['amount'] == 5e18
assert tx.events['AddShares'][0]['user'] == other
assert tx.events['AddShares'][0]['amount'] == 5e18


tx = mullet.transfer(extra, 1e18, {"from": other})

assert tx.events['Transfer'][0]['from'] == other
assert tx.events['Transfer'][0]['to'] == extra
assert tx.events['Transfer'][0]['value'] == 1e18

```

```

assert tx.events['RemoveShares'][0]['user'] == other

assert tx.events['RemoveShares'][0]['amount'] == 1e18

assert tx.events['AddShares'][0]['user'] == extra

assert tx.events['AddShares'][0]['amount'] == 1e18


owner.transfer(mullet, "1 ether")



tx = mullet.transfer(other, 1e18, {"from": owner})

assert tx.events['DepositRewards'][0]['user'] == mullet.address

assert tx.events['DepositRewards'][0]['amount'] == 1e18


tx = mullet.burn(1e18, {"from": extra})

assert tx.events['Transfer'][0]['from'] == extra

assert tx.events['Transfer'][0]['to'] == ZERO_ADDRESS

assert tx.events['Transfer'][0]['value'] == 1e18

assert tx.events['RemoveShares'][0]['user'] == extra

assert tx.events['RemoveShares'][0]['amount'] == 1e18

```

## Testing\_mullet\_v2.py

```

from brownie import (
    reverts,
)

from scripts.helpful_scripts import (
    ZERO_ADDRESS,
    get_account,
    calculate_sqrt_price_x96
)

```

```
from scripts.deploy import (
    deploy_erc,
    deploy_mullet,
    # dependencies
    deploy_weth,
    deploy_uniswap_v3_factory,
    deploy_swap_router,
    deploy_position_manager,
    deploy_position_descriptor,
    deploy_uniswap_v3_liquidity
)

def test_transfer_and_burn(only_local):
    # Arrange
    owner = get_account(0)
    other = get_account(1)
    extra = get_account(2)
    random_endpoint = get_account(3)

    # Deployment weth, router and factory
    weth = deploy_weth(owner)
    weth.deposit({"from": owner, "value": 10e18})
    factory = deploy_uniswap_v3_factory(owner)
    router = deploy_swap_router(owner, factory.address, weth.address)

    # Deploy mock token
    liquidity_token = deploy_erc(owner, "Liquidity", "LIQ")
```

```

liquidity_token.mint(owner, 100000e18)

# Deploy PositionManager

label = 0x4c4142454c

position_descriptor = deploy_position_descriptor(owner, weth.address, label)

position_manager = deploy_position_manager(owner, factory.address, weth.address,
position_descriptor.address)

# Uniswap V3 Liquidity

liquidity = deploy_uniswap_v3_liquidity(owner, weth.address, liquidity_token.address,
position_manager.address)

mullet = deploy_mullet(
    owner, weth.address, position_manager.address,
    factory.address, router.address, random_endpoint
)

# Create and initialize pool

fee = 500

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000) # 10000 LIQ - 1
WETH

tx = position_manager.createAndInitializePoolIfNecessary(
    weth.address, liquidity_token.address,
    fee, sqrt_price_X96, {"from": owner})

pool = tx.events['PoolCreated'][0]['pool']

tick_spacing = tx.events['PoolCreated'][0]['tickSpacing']

tick = tx.events['Initialize'][0]['tick']

# Mint

liquidity_token.approve(liquidity.address, 10000e18, {"from": owner})

```

```
weth.approve(liquidity.address, 1e18, {"from": owner})
```

```
tx = mullet.transfer(other, 5e18, {"from": owner})
```

```
assert tx.events['Transfer'][0]['from'] == owner
```

```
assert tx.events['Transfer'][0]['to'] == other
```

```
assert tx.events['Transfer'][0]['value'] == 5e18
```

```
assert tx.events['RemoveShares'][0]['user'] == owner
```

```
assert tx.events['RemoveShares'][0]['amount'] == 5e18
```

```
assert tx.events['AddShares'][0]['user'] == other
```

```
assert tx.events['AddShares'][0]['amount'] == 5e18
```

```
tx = mullet.transfer(extra, 1e18, {"from": other})
```

```
assert tx.events['Transfer'][0]['from'] == other
```

```
assert tx.events['Transfer'][0]['to'] == extra
```

```
assert tx.events['Transfer'][0]['value'] == 1e18
```

```
assert tx.events['RemoveShares'][0]['user'] == other
```

```
assert tx.events['RemoveShares'][0]['amount'] == 1e18
```

```
assert tx.events['AddShares'][0]['user'] == extra
```

```
assert tx.events['AddShares'][0]['amount'] == 1e18
```

```
owner.transfer(mullet, "1 ether")
```

```
tx = mullet.transfer(other, 1e18, {"from": owner})
```

```
assert tx.events['DepositRewards'][0]['user'] == mullet.address
```

```
assert tx.events['DepositRewards'][0]['amount'] == 1e18
```

```
tx = mullet.burn(1e18, {"from": extra})
```

```
assert tx.events['Transfer'][0]['from'] == extra
```

```
assert tx.events['Transfer'][0]['to'] == ZERO_ADDRESS

assert tx.events['Transfer'][0]['value'] == 1e18

assert tx.events['RemoveShares'][0]['user'] == extra

assert tx.events['RemoveShares'][0]['amount'] == 1e18
```

Testing\_Mullet.v3\_py:

```
from brownie import (
    reverts,
)

from scripts.helpful_scripts import (
    ZERO_ADDRESS,
    get_account,
    calculate_sqrt_price_x96
)

from scripts.deploy import (
    deploy_erc,
    deploy_mullet,
    # dependencies
    deploy_weth,
    deploy_uniswap_v3_factory,
    deploy_swap_router,
    deploy_position_manager,
    deploy_position_descriptor,
    deploy_uniswap_v3_liquidity
)
```

```
def test_transfer_and_burn(only_local):  
  
    # Arrange  
  
    owner = get_account(0)  
  
    other = get_account(1)  
  
    extra = get_account(2)  
  
    random_endpoint = get_account(3)  
  
  
    # Deployment weth, router and factory  
  
    weth = deploy_weth(owner)  
  
    weth.deposit({"from": owner, "value": 10e18})  
  
    factory = deploy_uniswap_v3_factory(owner)  
  
    router = deploy_swap_router(owner, factory.address, weth.address)  
  
  
    # Deploy mock token  
  
    liquidity_token = deploy_erc(owner, "Liquidity", "LIQ")  
  
    liquidity_token.mint(owner, 100000e18)  
  
  
    # Deploy PositionManager  
  
    label = 0x4c4142454c  
  
    position_descriptor = deploy_position_descriptor(owner, weth.address, label)  
  
    position_manager = deploy_position_manager(owner, factory.address, weth.address,  
position_descriptor.address)  
  
  
    # Uniswap V3 Liquidity  
  
    liquidity = deploy_uniswap_v3_liquidity(owner, weth.address, liquidity_token.address,  
position_manager.address)  
  
  
    mullet = deploy_mullet(  
        owner, weth.address, position_manager.address,
```

```

    factory.address, router.address, random_endpoint
)

# Create and initialize pool

fee = 500

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000) # 10000 LIQ - 1
WETH

tx = position_manager.createAndInitializePoolIfNecessary(
    weth.address, liquidity_token.address,
    fee, sqrt_price_X96, {"from": owner})

pool = tx.events['PoolCreated'][0]['pool']
tick_spacing = tx.events['PoolCreated'][0]['tickSpacing']
tick = tx.events['Initialize'][0]['tick']

# Mint

liquidity_token.approve(liquidity.address, 10000e18, {"from": owner})
weth.approve(liquidity.address, 1e18, {"from": owner})

tx = mullet.transfer(other, 5e18, {"from": owner})

assert tx.events['Transfer'][0]['from'] == owner
assert tx.events['Transfer'][0]['to'] == other
assert tx.events['Transfer'][0]['value'] == 5e18
assert tx.events['RemoveShares'][0]['user'] == owner
assert tx.events['RemoveShares'][0]['amount'] == 5e18
assert tx.events['AddShares'][0]['user'] == other
assert tx.events['AddShares'][0]['amount'] == 5e18

tx = mullet.transfer(extra, 1e18, {"from": other})

assert tx.events['Transfer'][0]['from'] == other

```

```

assert tx.events['Transfer'][0]['to'] == extra

assert tx.events['Transfer'][0]['value'] == 1e18

assert tx.events['RemoveShares'][0]['user'] == other

assert tx.events['RemoveShares'][0]['amount'] == 1e18

assert tx.events['AddShares'][0]['user'] == extra

assert tx.events['AddShares'][0]['amount'] == 1e18

owner.transfer(mullet, "1 ether")

tx = mullet.transfer(other, 1e18, {"from": owner})

assert tx.events['DepositRewards'][0]['user'] == mullet.address

assert tx.events['DepositRewards'][0]['amount'] == 1e18

tx = mullet.burn(1e18, {"from": extra})

assert tx.events['Transfer'][0]['from'] == extra

assert tx.events['Transfer'][0]['to'] == ZERO_ADDRESS

assert tx.events['Transfer'][0]['value'] == 1e18

assert tx.events['RemoveShares'][0]['user'] == extra

assert tx.events['RemoveShares'][0]['amount'] == 1e18

with reverts('ILP'):

    mullet.donateLiquidity(liquidity_token.address, 1e18, 1e18, 1e18, {"from": extra})

```

Test rewards:

```

from brownie import (
    reverts,
)

```

```
from scripts.helpful_scripts import (
    ZERO_ADDRESS,
    DAY_TIMESTAMP,
    get_account,
    increase_timestamp
)

from scripts.deploy import (
    deploy_rewards
)

def test_update(only_Local):
    # Arrange
    owner = get_account(0)
    other = get_account(1)
    extra = get_account(2)

    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)
    with reverts("T"):
        rewards.update(ZERO_ADDRESS, 1e18, False, {"from": other})
        tx = rewards.update(extra, 1e18, False, {"from": owner})
        assert tx.events['AddShares'][0]['user'] == extra
        assert tx.events['AddShares'][0]['amount'] == 1e18

    with reverts("R"):
        rewards.update(extra, 2e18, True, {"from": owner})
        tx = rewards.update(extra, 1e18, True, {"from": owner})
```

```

assert tx.events['RemoveShares'][0]['user'] == extra

assert tx.events['RemoveShares'][0]['amount'] == 1e18


def test_claim(only_local):
    # Arrange

    owner = get_account(0)
    other = get_account(1)
    extra = get_account(2)

    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)

    with reverts("I"):

        rewards.claim({"from": other})

        rewards.update(extra, 1e18, False, {"from": owner})

        increase_timestamp(DAY_TIMESTAMP * 8)

        rewards.depositRewards({"from": owner, "value": 1e17})

    tx = rewards.claim({"from": extra})

    assert tx.events['DistributeReward'][0]['user'] == extra
    assert tx.events['DistributeReward'][0]['amount'] == 9999999999999999

def test_payback_last_claim(only_local):
    # Arrange

    owner = get_account(0)
    other = get_account(1)
    extra = get_account(2)

    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)

```

```

    with reverts("ULK"):

        rewards.paybackLastClaim({"from": other})

    rewards.update(extra, 1e18, False, {"from": owner})

    increase_timestamp(DAY_TIMESTAMP * 8)

    rewards.depositRewards({"from": owner, "value": 1e17})

    rewards.claim({"from": extra})



    with reverts("E"):

        rewards.paybackLastClaim({"from": extra})

    with reverts(""):

        rewards.paybackLastClaim({"from": extra, "value": 9999999999999999})

#assert tx.events['DepositRewards'][0]['user'] == extra

#assert tx.events['DepositRewards'][0]['amountTokens'] == 1e17

```

Test\_rewards\_v2.py:

```

from brownie import (
    reverts,
)

from scripts.helpful_scripts import (
    ZERO_ADDRESS,
    DAY_TIMESTAMP,
    get_account,
    increase_timestamp
)

from scripts.deploy import (
    deploy_rewards
)

```

```
)
```

  

```
def test_update(only_Local):
```

  

```
    # Arrange
```

  

```
    owner = get_account(0)
```

  

```
    other = get_account(1)
```

  

```
    extra = get_account(2)
```

  
  

```
    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)
```

  

```
    with reverts("T"):
```

  

```
        rewards.update(ZERO_ADDRESS, 1e18, False, {"from": other})
```

  

```
        tx = rewards.update(extra, 1e18, False, {"from": owner})
```

  

```
        assert tx.events['AddShares'][0]['user'] == extra
```

  

```
        assert tx.events['AddShares'][0]['amount'] == 1e18
```

  
  

```
    with reverts("R"):
```

  

```
        rewards.update(extra, 2e18, True, {"from": owner})
```

  
  

```
        tx = rewards.update(extra, 1e18, True, {"from": owner})
```

  

```
        assert tx.events['RemoveShares'][0]['user'] == extra
```

  

```
        assert tx.events['RemoveShares'][0]['amount'] == 1e18
```

  
  

```
def test_claim(only_Local):
```

  

```
    # Arrange
```

  

```
    owner = get_account(0)
```

  

```
    other = get_account(1)
```

  

```
    extra = get_account(2)
```

```
rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)

with reverts("I"):

    rewards.claim(False, 1e17, {"from": other})

rewards.update(extra, 1e18, False, {"from": owner})

increase_timestamp(DAY_TIMESTAMP * 8)

rewards.depositRewards({"from": owner, "value": 1e17})

tx = rewards.claim(False, 1e17, {"from": extra})

assert tx.events['DistributeReward'][0]['user'] == extra
assert tx.events['DistributeReward'][0]['amount'] == 9999999999999999

def test_payback_last_claim(only_Local):

    # Arrange

    owner = get_account(0)

    other = get_account(1)

    extra = get_account(2)

    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)

    with reverts("ULK"):

        rewards.paybackLastClaim({"from": other})

    rewards.update(extra, 1e18, False, {"from": owner})

    increase_timestamp(DAY_TIMESTAMP * 8)

    rewards.depositRewards({"from": owner, "value": 1e17})

    rewards.claim(False, 1e17, {"from": extra})

    with reverts("E"):

        rewards.paybackLastClaim({"from": extra})
```

```
tx = rewards.paybackLastClaim({"from": extra, "value": 9999999999999999})  
  
assert tx.events['DepositRewards'][0]['user'] == extra  
  
assert tx.events['DepositRewards'][0]['amount'] == 9999999999999999
```

Test rewards v3:

```
from brownie import (  
  
    reverts,  
  
)  
  
from scripts.helpful_scripts import (  
  
    ZERO_ADDRESS,  
  
    DAY_TIMESTAMP,  
  
    get_account,  
  
    increase_timestamp  
  
)  
  
from scripts.deploy import (  
  
    deploy_rewards  
  
)  
  
def test_update(only_Local):  
  
    # Arrange  
  
    owner = get_account(0)  
  
    other = get_account(1)  
  
    extra = get_account(2)  
  
  
    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)  
  
    with reverts("T"):  
        pass
```

```

    rewards.update(ZERO_ADDRESS, 1e18, False, {"from": other})

    tx = rewards.update(extra, 1e18, False, {"from": owner})

    assert tx.events['AddShares'][0]['user'] == extra
    assert tx.events['AddShares'][0]['amount'] == 1e18

with reverts("R"):

    rewards.update(extra, 2e18, True, {"from": owner})

    tx = rewards.update(extra, 1e18, True, {"from": owner})

    assert tx.events['RemoveShares'][0]['user'] == extra
    assert tx.events['RemoveShares'][0]['amount'] == 1e18

def test_claim(only_local):

    # Arrange

    owner = get_account(0)
    other = get_account(1)
    extra = get_account(2)

    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)

    with reverts("I"):

        rewards.claim(False, 1e17, {"from": other})

        rewards.update(extra, 1e18, False, {"from": owner})

        increase_timestamp(DAY_TIMESTAMP * 8)

        rewards.depositRewards({"from": owner, "value": 1e17})

    tx = rewards.claim(False, 1e17, {"from": extra})

    assert tx.events['DistributeReward'][0]['user'] == extra

```

```

assert tx.events['DistributeReward'][0]['amount'] == 9999999999999999

def test_payback_last_claim(only_local):

    # Arrange

    owner = get_account(0)
    other = get_account(1)
    extra = get_account(2)

    rewards = deploy_rewards(owner, DAY_TIMESTAMP, 3 * DAY_TIMESTAMP)

    with reverts("ULK"):

        rewards.paybackLastClaim({"from": other})

        rewards.update(extra, 1e18, False, {"from": owner})

        increase_timestamp(DAY_TIMESTAMP * 8)

        rewards.depositRewards({"from": owner, "value": 1e17})

        rewards.claim(False, 1e17, {"from": extra})

    with reverts("E"):

        rewards.paybackLastClaim({"from": extra})

        tx = rewards.paybackLastClaim({"from": extra, "value": 9999999999999999})

        assert tx.events['DepositRewards'][0]['user'] == extra

        assert tx.events['DepositRewards'][0]['amount'] == 9999999999999999

```

Test mullet deployer:

```

from brownie import (
    reverts,
)

from scripts.helpful_scripts import (

```

```
ZERO_ADDRESS,  
get_account,  
calculate_sqrt_price_x96  
)  
  
from scripts.deploy import (  
    deploy_mullet,  
    deploy_mullet_deployer,  
    # dependencies  
    deploy_weth,  
    deploy_uniswap_v3_factory,  
    deploy_swap_router,  
    deploy_position_manager,  
    deploy_position_descriptor,  
)  
  
def test_create_mullet(only_local):  
    # Arrange  
    owner = get_account(0)  
    other = get_account(1)  
    random_endpont = get_account(2)  
  
    # Deployment weth, router and factory  
    weth = deploy_weth(owner)  
    factory = deploy_uniswap_v3_factory(owner)  
    router = deploy_swap_router(owner, factory.address, weth.address)  
  
    # Deploy PositionManager
```

```
label = 0x4c4142454c

position_descriptor = deploy_position_descriptor(owner, weth.address, label)

position_manager = deploy_position_manager(owner, factory.address, weth.address,
position_descriptor.address)

mu = deploy_mullet(
    owner, weth.address, position_manager.address,
    factory.address, router.address, random_endpont
)

mullet = deploy_mullet_deployer(
    owner, weth.address, position_manager.address,
    factory.address, mu.address
)

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000)

with reverts():
    mullet.createMulletPool(sqrt_price_X96, {"from": other})

tx = mullet.createMulletPool(sqrt_price_X96, {"from": owner})
assert tx.events['PoolCreated'] is not None
assert tx.events['Initialize'] is not None

def test_add_mullet_lp(only_local):
    # Arrange
    owner = get_account(0)
    other = get_account(1)
```

```
random_endpont = get_account(2)

# Deployment weth, router and factory

weth = deploy_weth(owner)

weth.deposit({"from": owner, "value": 10e18})

factory = deploy_uniswap_v3_factory(owner)

router = deploy_swap_router(owner, factory.address, weth.address)

# Deploy PositionManager

label = 0x4c4142454c

position_descriptor = deploy_position_descriptor(owner, weth.address, label)

position_manager = deploy_position_manager(owner, factory.address, weth.address,
position_descriptor.address)

mu = deploy_mullet(
    owner, weth.address, position_manager.address,
    factory.address, router.address, random_endpont
)

mullet = deploy_mullet_deployer(
    owner, weth.address, position_manager.address,
    factory.address, mu.address
)

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000)

mullet.createMulletPool(sqrt_price_X96, {"from": owner})

with reverts():

    mullet.addMulletLp({"from": other})
```

## Test\_muller\_deployer\_v2.py

```
from brownie import (
    reverts,
)
```

```
from scripts.helpful_scripts import (
    ZERO_ADDRESS,
    get_account,
    calculate_sqrt_price_x96
)
```

```
from scripts.deploy import (
    deploy_mullet,
    deploy_mullet_deployer,
    # dependencies
    deploy_weth,
    deploy_uniswap_v3_factory,
    deploy_swap_router,
    deploy_position_manager,
    deploy_position_descriptor,
)
```

```
def test_create_mullet(only_Local):
    # Arrange
    owner = get_account(0)
    other = get_account(1)
```

```
random_endpont = get_account(2)

# Deployment weth, router and factory

weth = deploy_weth(owner)

factory = deploy_uniswap_v3_factory(owner)

router = deploy_swap_router(owner, factory.address, weth.address)

# Deploy PositionManager

label = 0x4c4142454c

position_descriptor = deploy_position_descriptor(owner, weth.address, label)

position_manager = deploy_position_manager(owner, factory.address, weth.address,
position_descriptor.address)

mu = deploy_mullet(

    owner, weth.address, position_manager.address,
    factory.address, router.address, random_endpont

)

mullet = deploy_mullet_deployer(

    owner, weth.address, position_manager.address,
    factory.address, mu.address

)

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000)

with reverts():

    mullet.createMulletPool(sqrt_price_X96, {"from": other})
```

```
tx = mullet.createMulletPool(sqrt_price_X96, {"from": owner})

assert tx.events['PoolCreated'] is not None

assert tx.events['Initialize'] is not None


def test_add_mullet_lp(only_Local):
    # Arrange

    owner = get_account(0)

    other = get_account(1)

    random_endpont = get_account(2)

    # Deployment weth, router and factory

    weth = deploy_weth(owner)

    weth.deposit({"from": owner, "value": 10e18})

    factory = deploy_uniswap_v3_factory(owner)

    router = deploy_swap_router(owner, factory.address, weth.address)

    # Deploy PositionManager

    label = 0x4c4142454c

    position_descriptor = deploy_position_descriptor(owner, weth.address, label)

    position_manager = deploy_position_manager(owner, factory.address, weth.address,
position_descriptor.address)

    mu = deploy_mullet(

        owner, weth.address, position_manager.address,

        factory.address, router.address, random_endpont

    )

    mullet = deploy_mullet_deployer(
```

```
        owner, weth.address, position_manager.address,  
        factory.address, mu.address  
  
)  
  
  
sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000)  
mullet.createMulletPool(sqrt_price_X96, {"from": owner})  
  
with reverts():  
  
    mullet.addMulletLp({"from": other})
```

Test deployer v3:

```
from brownie import (  
  
    reverts,  
  
)  
  
  
from scripts.helpful_scripts import (  
  
    ZERO_ADDRESS,  
  
    get_account,  
  
    calculate_sqrt_price_x96  
)  
  
  
from scripts.deploy import (  
  
    deploy_mullet,  
  
    deploy_mullet_deployer,  
  
    # dependencies  
  
    deploy_weth,  
  
    deploy_uniswap_v3_factory,  
  
    deploy_swap_router,
```

```
    deploy_position_manager,  
  
    deploy_position_descriptor,  
)  
  
  
def test_create_mullet(only_Local):  
  
    # Arrange  
  
    owner = get_account(0)  
  
    other = get_account(1)  
  
    random_endpoint = get_account(2)  
  
    # Deployment weth, router and factory  
  
    weth = deploy_weth(owner)  
  
    factory = deploy_uniswap_v3_factory(owner)  
  
    router = deploy_swap_router(owner, factory.address, weth.address)  
  
  
    # Deploy PositionManager  
  
    label = 0x4c4142454c  
  
    position_descriptor = deploy_position_descriptor(owner, weth.address, label)  
  
    position_manager = deploy_position_manager(owner, factory.address, weth.address,  
position_descriptor.address)  
  
  
    mu = deploy_mullet(  
        owner, weth.address, position_manager.address,  
        factory.address, router.address, random_endpoint  
)  
  
  
    mullet = deploy_mullet_deployer(  
        owner, weth.address, position_manager.address,  
        factory.address, mu.address
```

```

    )

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000)

with reverts():

    mullet.createMulletPool(sqrt_price_X96, {"from": other})

tx = mullet.createMulletPool(sqrt_price_X96, {"from": owner})

assert tx.events['PoolCreated'] is not None

assert tx.events['Initialize'] is not None


def test_add_mullet_lp(only_Local):

    # Arrange

    owner = get_account(0)

    other = get_account(1)

    random_endpoint = get_account(2)

    bundle_wallet = get_account(3)

    # Deployment weth, router and factory

    weth = deploy_weth(owner)

    weth.deposit({"from": owner, "value": 10e18})

    factory = deploy_uniswap_v3_factory(owner)

    router = deploy_swap_router(owner, factory.address, weth.address)

    # Deploy PositionManager

    label = 0x4c4142454c

    position_descriptor = deploy_position_descriptor(owner, weth.address, label)

```

```
position_manager = deploy_position_manager(owner, factory.address, weth.address,
position_descriptor.address)

mu = deploy_mullet(
    owner, weth.address, position_manager.address,
    factory.address, router.address, random_endpoint
)

mullet = deploy_mullet_deployer(
    owner, weth.address, position_manager.address,
    factory.address, mu.address
)

sqrt_price_X96 = calculate_sqrt_price_x96(token0 = 1, token1= 10000)

mullet.createMulletPool(sqrt_price_X96, {"from": owner})

with reverts():

    mullet.addMulletLp(20, [bundle_wallet], {"from": other})

    with reverts("M"):

        mullet.addMulletLp(101, [bundle_wallet], {"from": owner})
```

# Technical Findings Summary

## Findings

Vulnerability Level	Total	Pending	Not Apply	Acknowledged	Partially Fixed	Fixed
● High	0					
● Medium	0					
● Low	0					
● Informational	1					1

# Assessment Results

## Score Results

Review	Score
<b>Global Score</b>	<b>95/100</b>
Assure KYC	<a href="https://assureddefi.com/projects/project-mullet/">https://assureddefi.com/projects/project-mullet/</a>
Audit Score	90/100

The Following Score System Has been Added to this page to help understand the value of the audit, the maximum score is 100, however to attain that value the project must pass and provide all the data needed for the assessment. Our Passing Score has been changed to 84 Points for a higher standard, if a project does not attain 85% is an automatic failure. Read our notes and final assessment below. The Global Score is a combination of the evaluations obtained between having or not having KYC and the type of contract audited together with its manual audit.

## Audit PASS

Following our comprehensive security audit of the token contract for Mullet project, we inform you that the project has met the necessary security standards. The only reported issue has been fixed in the version [**mullet-main\_v2.zip**]. The latest changes made in version 3 have been reviewed and no vulnerabilities have been detected (test codes are added in the appendices).

# Disclaimer

Assure Defi has conducted an independent security assessment to verify the integrity of and highlight any vulnerabilities or errors, intentional or unintentional, that may be present in the reviewed code for the scope of this assessment. This report does not constitute agreement, acceptance, or advocating for the Project, and users relying on this report should not consider this as having any merit for financial advice in any shape, form, or nature. The contracts audited do not account for any economic developments that the Project in question may pursue, and the veracity of the findings thus presented in this report relate solely to the proficiency, competence, aptitude, and discretion of our independent auditors, who make no guarantees nor assurance that the contracts are entirely free of exploits, bugs, vulnerabilities or depreciation of technologies.

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