Puffer Finance xERC20 and Validator Pricer

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Executive Summary

This report presents the results of our engagement with Puffer Finance to review their latest round of changes, including the new xERC20 implementation, as well as the validator ticket pricer and the updated timelock smart contracts.

The review was conducted over one week, from June 3rd, 2024 to June 7, 2024, by Valentin Quelquejay and Dominik Muhs. A total of ten person-days were spent.

No critical/high security issues were identified during the review. The set of changes in scope is simple and well-written, and the xERC20 implementation is very close to the reference implementation, which has been scrutinized by Creed in the past.

Scope and Objectives

Our review focused on the following commit hashes:

- PufferPool: `af17eaf29b09246ab2a4e88260def2cfe7591228`
- PufETH: `10580523278776018b7f51d6a704ba2dd3c580fe`

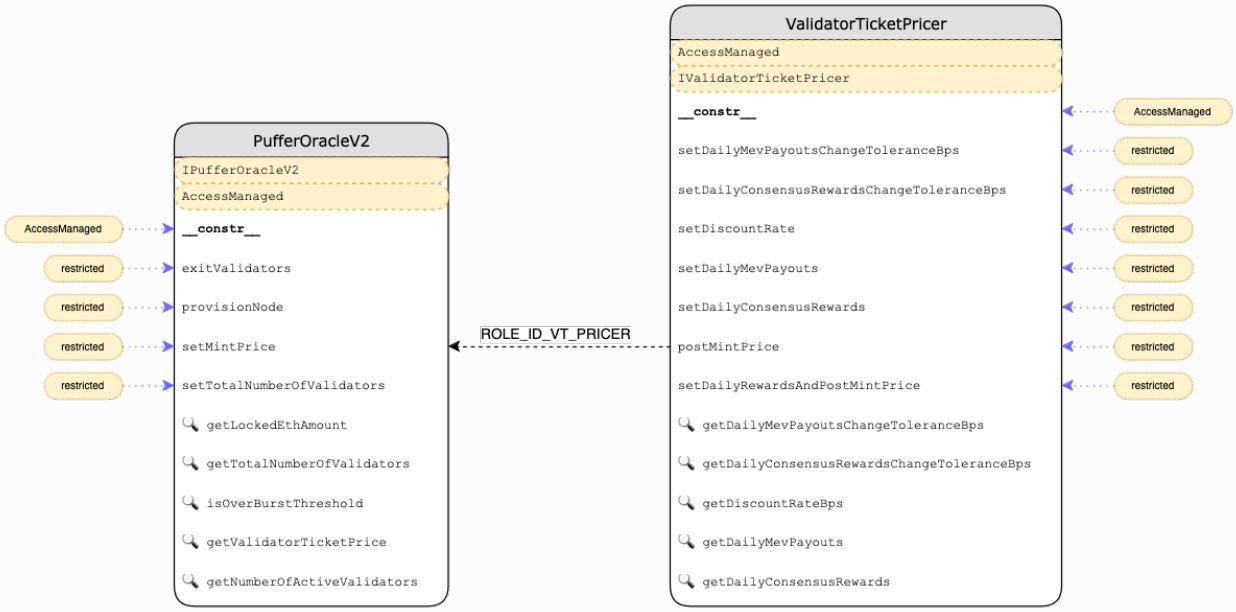
Specifically, the scope focused on the following pull request changes: PufferPool #260, pufETH #80, and pufETH #82.

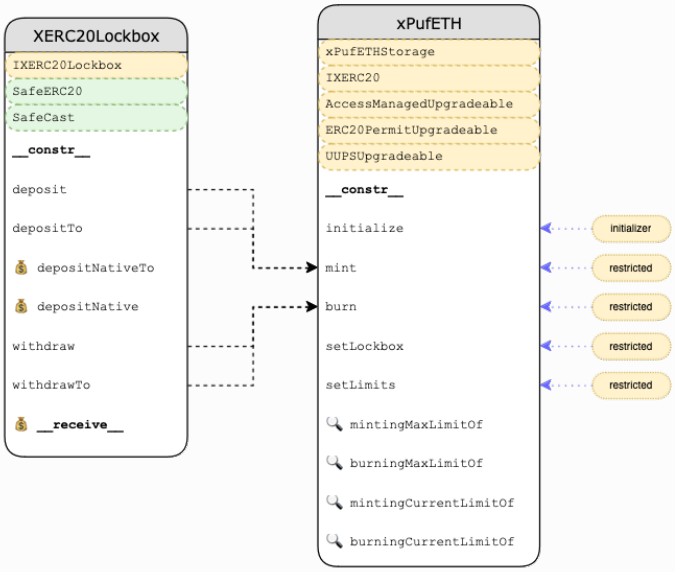
As part of the mitigation review, Creed reviewed puffer-contracts #3.

Together with the Puffer Finance team, we identified the following priorities for our review:

- Review potential cross-chain security issues in the xERC20 implementation.
- Ensure that the system is implemented consistently with the intended functionality, and without unintended edge cases.
- Identify known vulnerabilities particular to smart contract systems, as outlined in our Smart Contract Security Field Guide, and the ones outlined in the EEA EthTrust Security Levels Specification.

Audit Artifacts





Findings

Minor Incorrect Roles during Deployment

Acknowledged

The `Timelock` contract expects a variety of actors in its constructor. During the deployment process in `DeployL2XPufETH.s.sol`, all the relevant actors (operations, pauser, community) are set to the same broadcaster address.

pufETH/script/DeployL2XPufETH.s.sol

```
44 operationsMultisig = _broadcaster;
45 pauserMultisig = _broadcaster;
46 communityMultisig = _broadcaster;
```

Recommendation

We recommend verifying and using the environment variables' values to set each role's address.

None Inconsistencies in the input validation of private/public `setPauser` and `setDelay` functions

Fixed

This issue has been addressed in commit [b0b27934882327ac29e948b492441e4409c03fce](b0b27934882327ac29e948b492441e4409c03fce).

The `setPauser` and `setDelay` functions are designed to update critical parameters but have inconsistencies in where validation checks are performed:

- setPauser: Validates the new pauser address within the public function before calling the internal function.
- setDelay: Performs delay validation inside the internal `_setDelay` function and not the public function.

pufETH/src/Timelock.sol

```
281 if (newPauser == address(0)) {
282     revert BadAddress();
283 }
```

pufETH/src/Timelock.sol

```
293 if (newDelay <= MINIMUM_DELAY) {
294     revert InvalidDelay(newDelay);
295 }
```

We recommend performing the validation checks by moving the zero address validation from the public `setPauser` function to the private `_setPauser` function, ensuring all checks are performed within the private functions for consistency.

File Hashes

- ./code/PufferPool/src/ValidatorTicketPricer.sol
  - 4fb7d2fccaf394e835d69ce82e3ddab16ed9b6734c4ee61b8b3906f58600ba9b
- ./code/pufETH/src/l2/xPufETHStorage.sol
  - 874df01cbc6064a2d1ef33289f97dca4716a128eea738c285052de5339faf480
- ./code/pufETH/src/l2/xPufETH.sol
  - 40747702d47b34a958d78c121a88a9644195edf97db66454402f1fe4ffc68f00
- ./code/pufETH/src/Timelock.sol
  - d8a733b32049ba12bb9bbe31fb7bfc51e54393bf8fd9a494e9d30a7a846304ac
- ./code/pufETH/src/XERC20Lockbox.sol
  - a8c7d825501ea1fcf856e4af0e2ceb8122200a9933cf50ce42b592e2b191ef64

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