



# **Protocol Security Review Report**

Version 1.0

*PixelPulseBlog*

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Protocol Summary

PasswordStore is a protocol specifically crafted for storing and retrieving a user’s passwords. It’s intended for use by a sole user and isn’t configured for multi-user access. Access to set and retrieve passwords should be restricted to the owner exclusively.

Disclaimer

The PixelPulseBlog team makes all effort to find as many vulnerabilities in the code in the given time period, but holds no responsibilities for the findings provided in this document. A security audit by the team is not an endorsement of the underlying business or product. The audit was time-boxed and the review of the code was solely on the security aspects of the Solidity implementation of the contracts.

Risk Classification

		Impact		
		High	Medium	Low
Likelihood	High	H	H/M	M
	Medium	H/M	M	M/L
	Low	M	M/L	L

We use the CodeHawks severity matrix to determine severity. See the documentation for more details.

Audit Details

\*\* The finding describe in this document correspond the following commit hash:

```
1 7d55682ddc4301a7b13ae9413095feffd9924566
```

Scope

```
1 ./src/  
2 -== PasswordStore.sol
```

## Roles

Owner: The user who can set the password and read the password. Outsiders: No one else should be able to set or read the password.

## Executive Summary

\*We collaborated with a top-notch security researcher for 24 hours, utilizing FoundFry, and successfully launched our own local blockchain for testing and reproducing the bugs we found.

## Issues found

Severity	Number of issues found
High	2
Medium	0
Low	0
Informational	1
Total	3

## Findings

### High

#### [H-1] Storing the password on-chain makes it visible to anyone, and no longer private

**Description:** All data stored on-chain is visible to anyone, and can be read directly from the blockchain. The `PasswordStore:s_password` variable is intended to be private variable and only accessed through the `PasswordStore:getPassword` function, which is intended to be only called by the owner of the contract.

We show one such method of reading any data off chain below

**Impact:** Anyone can read the private password, severely breaking the functionality of the protocol.

### Proof of Concept: (Proof of Code)

The below test case shows how anyone can read the password directly from the blockchain.

- ## 1. Create a locally running chain

1 anvil

- ## 2. Deploy the contract to the chain

```
1 forge script script/DeployPasswordStore.s.sol:DeployPasswordStore --rpc
  -url http://localhost:8545 --private-key 0
  xac0974bec39a17e36ba4a6b4d238ff944bacb478cbcd5efcae784d7bf4f2ff80 --
  broadcast
```

- ### 3. Run the storage tool

- We run 1 because that's the storage slot of `PasswordStore::s_password` in the contract.

```
1 cast storage <contract-address-here> 1 --rpc-url http://localhost:8545
```

- You'll get an output that looks like this:

[illegible]

- You can then parse that hex to a string with:

[illegible]

- And get an output of:

```
1 myPassword
```

**Recommended Mitigation:** Due to this, the overall architecture of the contract should be rethought. One could encrypt the password off-chain, and then store the encrypted password on-chain. This would require the user to remember another password off-chain to decrypt the password. However, you'd also likely want to remove the view function as you wouldn't want the user to accidentally send a transaction with the password that decrypts the user password.

**[H-2] PasswordStore::setPassword has no access controls, meaning a non-owner could change the password**

**Description:** The `PasswordStore::setPassword` function is set to be an `external` function, however, the natspec of the function and overall purpose of the smart contract is that This function allows only the owner to set a `new` password.

```
1 function setPassword(string memory newPassword) external {
2   @> // @audit - There are no access controls
3     s_password = newPassword;
4     emit SetNetPassword();
5 }
```

**Impact:** Anyone can set/change the password of the password of the contract, severely breaking the contract intended functionality.

**Proof of Concept:** Add the following to `PasswordStore.t.sol` test file.

Code

```
1 function test_anyone_can_set_password(address randomAddress) public
2 {
3   vm.assume(randomAddress != owner);
4   vm.prank(randomAddress);
5   string memory expectedPassword = "randomPassword";
6   passwordStore.setPassword(expectedPassword);
7
8   vm.prank(owner);
9   string memory actualPassword = passwordStore.getPassword();
10  assertEq(actualPassword, expectedPassword);
11 }
```

**Recommended Mitigation:** Add an access control conditional to the `PasswordStore::setPassword` function.

```
1 if(msg.sender != s_owner) {
2   revert PasswordStore_NotOwner();
3 }
```

**Informational**

**[I-1] The PasswordStore::getPassword natspec indicate a parameter that doesn't exist, causing the natspec to be incorrect**

**Description:**

```
1      /*
2      * @notice This allows only the owner to retrieve the password.
3      @>    * @param newPassword The new password to set.
4      */
5      function getPassword() external view returns (string memory) {
6          if (msg.sender != s_owner) {
7              revert PasswordStore__NotOwner();
8          }
9          return s_password;
10     }
```

The `PasswordStore::getPassword` function signature is `getPassword()` while the natspec says it should be `getPassword(string)`.

**Impact:** The natspec is incorrect.

**Recommended Mitigation:** Remove the incorrect natspec line.

```
1
2 -    * @param newPassword The new password to set.
```