



Protocol Audit Report

Version 1.0

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Protocol Summary

PasswordStore is a protocol dedicated to storage and retrieval of a user’s passwords. The protocol is designed to be used by a single user, and is not designed to be used by multiple users. Only the owner should be able to set and access this password.

Disclaimer

I (Duc Nghia Pham) make 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 me 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

Commit Hash:

The findings described in this document correspond the following commit hash:

```
1 2e8f81e263b3a9d18fab4fb5c46805ffc10a9990
```

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

*I spend 5 hours using 3 tools: Forge, cloc, solidity metrics

Issues found

Severity	Number of issues found
Hight	2
Medium	0
Low	0
Info	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 a 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 of 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 blockchain.

- ## 1. Create a locally running chain

```
1 make anvil
```

- ## 2. Deploy the contract to the chain

```
1 make deploy
```

3. run the storage tool We use 1 because that's storage slot of `s_password` in the contract.

```
1 cast storage <ADDRESS_HERE> 1 --rpc-url http://127.0.0.1:8545
```

You'll get an output that looks like this:

[illegible]

You can then parse that hex to a string with:

[illegible]

You get an output of:

```
1 myPassword
```

Recommended Mitigation: Due to this, the overall architecture of contract should be rethought. One could encrypt the password off-chain, and then store 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 your password.

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

Description: `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 contract, severely breaking the contract intended functionality.

Proof of Concept: Add the following to the `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 = "myNewPassword";
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 `setPassword` function.

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

Informational

[I-1] PasswordStore::getPassword natspec indicates 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) {
```

The `PasswordStore::getPassword` function signature is `getPassword()` which contradicts the natspec indicating a parameter `newPassword`.

Impact: The natspec is incorrect.

Recommended Mitigation: Remove the incorrect natspec line.

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