\begin{titlepage} \centering \begin{figure}[h] \centering \includegraphics[width=0.5\textwidth]{logo.pdf} \end{figure} \vspace*{2cm} {\Huge\bfseries Protocol Audit Report\par} \vspace{1cm} {\Large Version 1.0\par} \vspace{2cm} {\Large\itshape Cyfrin.io\par} \vfill {\large \today\par} \end{titlepage}

\maketitle

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Protocol Summary

PasswordStore is a protocol dedicated to storage and retrieval of a user's password. The protocol is designed to bu 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

The PRIVATE 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
	High	H	H/M	M
Likelihood	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 findings described in this document correspond the following commit hash:

```
2e8f81e263b3a9d18fab4fb5c46805ffc10a9990
```

Scope

```
./src/
└── 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

Add some notes about how the audit went, types of things you found, etc.

We spent X hours with Z auditors using Y tools. etc

Issues found

Severity	Number of issues found

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

Findings

High

[H-1] Storing the password on-chain makes it visable to anyone, and no longer private (root cause + impact)

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 accesed through the `PasswordStore::getPassword` function, which is inteded to be only called by the owner of the contract.

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

Impact: Anyone can read the private password, severly 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

```
make anvil
```

2. Deploy the contract to the chain

```
make deploy
```

3. Run the storage tool

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

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

You'll get an output that looks like this:

`0x6d7950617373776f726400000000000000000000000000000000000000000014`

you can then parse that hex to a string with:

```
cast parse-bytes32-string
0x6d7950617373776f726400000000000000000000000000000000000000000014
```

And get an output of:

```
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 decypt 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.

Likelihood & Impact:

- Impact: HIGH
- Likelihood: HIGH
- Severity: HIGH

[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 samrt contract is that `This function allows only the owner to set a new password.`

```
    function setPassword(string memory newPassword) external {
@>    // @audit - There are no access controls
      s_password = newPassword;
      emit SetNewPassword();
    }
```

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

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

▶ Code

```
function test_anyone_can_set_password(address randomAddress) public {
        vm.assume(randomAddress != owner);
        vm.prank(randomAddress);
        string memory expectedPassword = "myNewPassword";
        passwordStore.setPassword(expectedPassword);

        vm.prank(owner);
        string memory actualPassword = passwordStore.getPassword();
        assertEq(actualPassword, expectedPassword);
    }
```

Recommended Mitigation: Add an access control conditional to the 'setPassword' function.

```
if (msg.sender == owner) {
    revert PasswordStore__NotOwner();
}
```

Likelihood & Impact:

- Impact: HIGH
- Likelihood: HIGH
- Severity: HIGH

Informational

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

Description:

```
    /*
    * @notice This allows only the owner to retrieve the password.
@>  * @param newPassword the new password to set.
    */
function getPassword() external view returns (string memory){

}
```

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

Impact: The natspec is incorrect

Recommended Mitigation: Remove the incorrect natspec line.

```
-       * @param newPassword the new password to set.
```

Likelihood & Impact:

- Impact: NONE
- Likelihood: HIGH
- Severity: Informational/Gas/Non-crits

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

Description:

```
    /*
    * @notice This allows only the owner to retrieve the password.
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The `PasswordStore::getPassword` function signature os `getPassword` while the natspec say it should be `getPassword(string)`.

Impact: The natspec is incorrect

Recommended Mitigation: Remove the incorrect natspec line.

```
-       * @param newPassword the new password to set.
```

Likelihood & Impact:

- Impact: NONE
- Likelihood: HIGH
- Severity: Informational/Gas/Non-crits