Protection of information based on sensitivity and privilege levels

Continuous assessment

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Table of Contents

Table of Figures

1 Introduction

The protection of data based on sensitivity and privilege levels is an important method in the field of information security. This strategy controls access privileges by categorising data according to its criticality. Strict controls are used to protect susceptible information, such as personal or confidential papers, to ensure that only those with the right access privileges can access and change it. Less sensitive data, on the other hand, can have broader access rights to support everyday activities. By balancing data security and practical workflow, organisations can preserve priceless assets while enabling authorised individuals to carry out their duties with efficiency.

2 System Overview

This is a system for a medical management system that stores user data and manipulates them. The user can't sign up to the system. User registration will be handled by the administrator. After the admin adds a user, the user can log in to the system with the password, and after that user can change the password. When the user tries to log in to the system, user inputs will be authenticated by the system and checked with the stored data. If and only if user credentials match with the stored data, the user will be privileged to enter the system.

3 System Roles

3.1 Administrator

The administrator can log in to the system with the username and password. The administrator can add and remove all other users to the system. Not only that, but the administrator can also view all the users in the system category-wise. However, the administrator has no access to the user's details (Password) and patients' medical details.

3.2 Doctor

Doctors also must log in to the system with the username and password. After login, a doctor can get the list of other doctors and the list of all patients. A doctor can view the medical report of any specific patient. Also, a doctor can update the patient's medical report.

3.3 Staff

Staff members also must log in to the system with the username and the password. Staff members have the privilege to view the list of all the doctors and check the medical report of a patient.

3.4 Patient

All the patients must log in to the system with the username and password. A patient a view all of the doctors and their medical reports.

4   Summary of the Access Privilege levels.

	Admin	Doctor	Staff	Patient
Change Password	✓	✓	✓	✓
View all the doctors	✓	✓	✓	✓
View all patients	✓	✓	✓	
view all staff	✓			
View patient medical reports		✓	✓	✓ (own report)
Update medical reports		✓		
Add/ remove users	✓			

Table 1: Privilege levels of the system

5   System Flow

5.1   Admin


```
Enter your username:
Mark
Enter your password:
Mark
Welcome Admin mark
==================== Enter your choice ====================
1 : view all doctors
2 : View all patients
3 : View all staff members
4 : Add doctor
5 : Remove doctor
6 : Add staff member
7 : Remove staff member
8 : Add patient
9 : Remove patient
10 : change password
11 : Logout
===========================================================
|
```

Figure 1: Admin interface

Admin can see this interface after logging into the system. Admin can select the process to initialize after entering the relevant number.

5.1.1 View all doctors.

```
============================================================
1
ID          Doctor Name    : Ward
1           Smith          : 1A
2           Silva          : 3B
3           Johnson        : 2A
=================== Enter your choice ====================
1 : view all doctors
2 : View all patients
3 : View all staff members
4 : Add doctor
5 : Remove doctor
6 : Add staff member
7 : Remove staff member
8 : Add patient
9 : Remove patient
10 : change password
11 : Logout
============================================================
```

Figure 2: View all doctors.

Only the doctor's ID, name and the ward will be displayed. Doctors' confidential data are not visible here.

5.1.2 View all patients.

```
============================================================
2
ID        Age        : Patient Name
1         12         : John Doe
2         23         : Jane Smith
3         56         : Alice Johnson
=================== Enter your choice ====================
1 : view all doctors
2 : View all patients
3 : View all staff members
4 : Add doctor
5 : Remove doctor
6 : Add staff member
7 : Remove staff member
8 : Add patient
9 : Remove patient
10 : change password
11 : Logout
============================================================
```

Figure 3: View all patients.

Only the ID, name and age of the patient are displayed here. Patients' other confidential data for medical data is not displayed here.

5.1.3 Add a patient.

```
============================================================
8
Enter username
New User
Enter password
New User
Enter decease
Head Ache
Enter age
34
**************** Patient added successfully ****************
==================== Enter your choice ====================
1 : view all doctors
2 : View all patients
3 : View all staff members
4 : Add doctor
5 : Remove doctor
6 : Add staff member
7 : Remove staff member
8 : Add patient
9 : Remove patient
10 : change password
11 : Logout
============================================================
```

Figure 4: Add patient interface.

```
{
  "medications": {
    "decease": "Head Ache",
    "drug_prescriptions": {},
    "lab_tests": {}
  },
  "id": 4,
  "username": "New User",
  "password": "19a093af0cee2a1d0f8bb6ac14d79843",
  "role": "patient",
  "age": 34
}
```

Figure 5: Added patient data

Admin has no privilege to enter the medical records of the patient. Empty drug prescriptions and lab test fields will be created. Doctors can update these fields. All the passwords will be saved in the system after hashing. No one can directly see and get the password. It ensures the confidentiality of the system.

5.2   Doctor

Figure 6: Doctor interface

After logging into the system, a doctor can initialize these tasks.

5.2.1   Update Patient Medical Report

Figure 7: Update user medical report interface

```json
{
  "medications": {
    "decease": "Head ache",
    "drug_prescriptions": {
      "Aspirin": "1 tablet per day",
      "Antibiotic": "2 capsules twice a day",
      "Vitamin C": "2 pills before meal"
    },
    "lab_tests": {
      "2023-10-19": "Bad health condition",
      "2023-10-18": "This is a note for John Doe on October 18, 2023."
    }
  },
}
```

Figure 8: Updated patient medical data

A doctor can update the medical report of the patient. Only the doctors have access to this medical report update task. In addition to this, a doctor can view all the patients, view the medical records of a specific patient, change passwords, and log out of the system.

5.3   Staff Member

Figure 9: Staff member interface

5.3.1 View the medical report of a patient.

```
============================================================
2
Enter patient id
1
Patient name:      John Doe
Patient age:       12
Patient decease:   Head ache
 ----- Patient drug prescription -----
Aspirin                  : 1 tablet per day
Antibiotic               : 2 capsules twice a day
Vitamin C                : 2 pills before meal
----- Patient lab report -----
2023-10-19               : Bad health condition
2023-10-18               : This is a note for John Doe on October 18, 2023.
=================== Enter your choice ====================
1 : view all doctors
2 : view patient record
3 : view all patients
4 : change password
5: Logout
============================================================
```

Figure 10: View patient medical report interface

Although staff members have access to view the patient records, they have no privilege to update the medical reports.

In addition to that, a staff member can execute, view all doctors, view all patients, change the password, and log out functions.

5.4 Patient

Figure 11: Patient Interface

5.4.1 View personal medical report.

```
============================================================
2
Decease        : Head ache
*** Medicines ***
Drug           : Dosage
Aspirin        : 1 tablet per day
Antibiotic     : 2 capsules twice a day
Vitamin C      : 2 pills before meal
*** Notes ***
Date           : Lab test note
2023-10-19     : Bad health condition
2023-10-18     : This is a note for John Doe on October 18, 2023.
=================== Enter your choice ===================
1 : view all doctors
2 : View my medical report
3 : change password
4 : Logout
============================================================
```

Figure 12: View your medical report interface.

A patient can log in to the system and check their medical report. In addition to that, a patient can view all the doctors and change the password.

5.5   Other Functionalities

5.5.1   Change Password

```
============================================================
10
Enter your current password:
Mark
Enter your new password:
Mark123
Password changed successfully
Please login again
Enter your username:
Mark
Enter your password:
Mark123
Welcome Admin mark
```

Figure 13: Change password interface

All users are facilitated with the change password option. After the admin creates an account for the user, the user can log into the system and change the password.

5.5.2   Logging Out

Figure 14: Log-out interface.

Finally, the admin can log out from the system. Apart from these tasks, the admin can view the list of all the staff members, add doctors, remove doctors, add staff members, and remove staff members.

5.5.3   Wrong Credentials

Figure 15: Wrong credentials interface

The system will check the user inputs and notify the user if the given credentials do not match with the system.

6   Source Code

https://github.com/Nuwan-alt/CS-CA.git