PROTECTION OF INFORMATION BASED ON SENSITIVITY AND PRIVILEGE LEVELS

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Objectives

1. Program writes into and reads from a configuration file the following parameters: usernames, hashes of passwords (MD5), user type (patient or hospital staff category), privilege level of each username.
2. Program writes into and reads from a data file the following data records: personal details, sickness details, drug prescriptions, and lab test prescriptions, each data record is associated with a privilege level depending on its sensitivity.
3. Each data record is due to an encounter with a patient.
4. Hospital staff can read or write data based on sensitivity level.

Implementation

1. Program is written in python and data files are stored as txt.
2. In terms of management, two types of users are identified here: "staff", "patient".
3. Staff is again categorized into "doctors" and "nurses".
4. Signup option for the system is only provided for the staff members and they will include user credential for the patients, username as patient's id and password as patient's mobile phone number.
5. Patient can change his user credentials at the very first login.
6. Any user must log into the systems to either read or write data which depends on their privilege level, using their username and password (MD5 encrypted).
7. Admin can view all the registered users along with their user ids to find any violations have happened in terms of the registered users.

Privilege Levels

User Type	Privilege Level	Privileges
Admin	0	View usernames and user ids of registered users.
Doctor	1	Add patients and their reports, view patients' records
Nurse	2	View any patient's records by patient's id
Patient	3	View patient's own records

8. Written access to files is only given to doctors.
9. Doctor, nurse and patient are viewing details through three separate channels and they are clearly defined in the implementation.

Source Code

```python
import hashlib as h
import getpass

class ABChospital:

    def _init_(self):
        self.username=""
        self.privilege=""
        self.userid=""

    def userInput(self):
        print("Welcome to ABC Hospital Management System")
        print("----------------------------------------")
        print("----------------------------------------")
        userinit = input("Login or SignUp? (login/signup)")
        userinit = userinit.lower()
        if userinit == "login":
            self.logIn()
        elif userinit == "signup":
            self.signUp()
        else:
            print("Invalid Credentials")

    def signUp(self):
        print("SignUp is Stricly Reseicted to ABC Hospital Employees")
        username = input("Please Enter a Username: ")
        password = getpass.getpass("Please Enter a Password: ")
        usertype = "staff"
        empid = input("Please Enter Your Employee Id: ")
        print("Please Follow these Instructions when Answering the Next Questi
on")
        print("If you are a doctor, answer as 1")
        print("If you are a nurse, answer as 2")
        privilege = input("Which Category are You Falling Into?")
        self.writeConfig(username,password,empid,usertype,privilege)
        print("Registration Successful")
        print("Please Login")
        self.logIn()

    def logIn(self):
        print("If you are not having an account, enter 'signup' as the usernam
e ")
        username = input("Enter Your Username: ")
        if (username == "signup"):
            self.signUp()
```

```python
        password = getpass.getpass("Enter Password: ")
        seek = 0
        while not self.validate(username, password):
            seek+=1
            if (seek<5):
                username = input("Enter Your Username: ")
                password = getpass.getpass("Enter Your Password: ")
            else:
                print("Session Terminated")
        else:
            print ("You are Authorized")
            print ("Logged In")
            self.tasks()

    def writeConfig(self,username, password, userid, usertype, privilege):
        with open("config.txt", "a") as file:
            file.write(username + "," + h.md5(password.encode("utf-
8")).hexdigest() + ","+userid+","+ usertype+","+privilege + "\n")

    def validate(self,username, password):
        users = self.readConfig()
        for line in users:
            if line[0] == username and line[1] == h.md5(password.encode("utf-
8")).hexdigest():
                if (self.readData(username, "first")):
                    print("You are Logging in for the First Time")
                    newusername = input("Enter A New Username: ")
                    newpassword = getpass.getpass("Enter A New Password: ")
                    rfile = open("config.txt", "r")
                    lines = rfile.readlines()
                    for found in range(len(lines)):
                        if (username in lines[found]):
                            content = lines[found].rstrip("\n").split(",")
                            content[0] = newusername
                            content[1] = h.md5(newpassword.encode("utf-
8")).hexdigest()

                            content = content[0] + "," + content[1] + ","+cont
ent[2]+","+ content[3]+","+ content[4]+ "\n"
                            rfile = open("config.txt", "w")
                            rfile.writelines(lines)
                    for found in range(len(lines)):
                        if (username in lines[found]):
                            lines[found] = content
                    rfile = open("config.txt", "w")
                    rfile.writelines(lines)
                    rfile.close()
                    content = content.rstrip("\n").split(",")
                    self.username = content[0]
```

```python
                    self.userid = content[2]
                    self.privilege = content[4]
                else:
                    self.username = line[0]
                    self.userid = line[2]
                    self.privilege = line[4]
                return True
            else:
                continue
        else:
            print("Incorrect Username or Password!")
            return False

    def readConfig(self):
        with open("config.txt", "r") as file:
            users = []
            for line in file:
                users.append(line.rstrip("\n").split(","))
        return users

    def readData(self, patient_id, event):
        with open("data.txt", "r") as file:
            records = []
            for line in file:
                records.append(line.rstrip("\n").split(","))
        if self.privilege in ["1","2","3"]:
            for record in records:
                if record[0] == patient_id:
                    print(record)
        if (event == "first"):
            for record in records:
                if record[0] == patient_id:
                    return True
            else:
                return False

    def writeData(self,patient_id,name,age,sex,mobile,illness,doctor,prescript
ion,lab_test_prescription):
        with open("data.txt", "a") as file:
            print("Patient's Data: ")
            print("["+patient_id+","+name+","+age+","+sex+","+mobile+","+illne
ss+","+prescription+","+lab_test_prescription+"]")
            file.write(patient_id+","+name+","+age+","+sex+","+mobile+","+illn
ess+","+doctor+","+prescription+","+lab_test_prescription+"\n")
            print("Data Record Added Successully")

    def tasks(self):
        event = "read"
```

```python
        if self.privilege == "0":
            print("Welcome to Admin Panel of ABC Hospital Management System")
            users = self.readConfig()
            for user in users:
                print(user[0],user[2])
        elif self.privilege == "1":
            print("Welcome to Doctor's Panel of ABC Hospital Management System
")
            reason = input("Do You Wish to Add a New Patient:(yes/no) ")
            reason = reason.lower()
            if (reason == "yes"):
                patient_id = input("Enter Patient's Id: ")
                name = input("Enter Patient's Name: ")
                age = input("Enter Patient's Age: ")
                sex = input("Enter Patient's Sex: ")
                mobile = input("Enter Patient's Mobile: ")
                illness = input("Enter Patient's Illness: ")
                doctor = self.userid
                prescription = input("Enter Patient's Prescription: ")
                lab_test_prescription = input("Enter Patient's Lab Test Prescr
iption: ")
                usertype = "patient"
                self.writeData(patient_id,name,age,sex,mobile,illness,doctor,p
rescription,lab_test_prescription)
                self.writeConfig(patient_id, mobile, patient_id,usertype,"3")
            elif (reason =="no"):
                print("Please Enter the Patient Id to View Data")
                patient_id = input("Enter Patient's Id: ")
                self.readData(patient_id,event)
        elif self.privilege == "2":
            print("Welcome to Nurse's Panel of ABC Hospital Management System"
)
            print("Please Enter the Patient Id to View Data")
            patient_id = input("Enter Patient's Id: ")
            self.readData(patient_id,event)
        elif self.privilege == "3":
            print("Welcome to Patient's Panel of ABC Hospital Management Syste
m")
            patient_id = self.userid
            self.readData(patient_id,event)

abc_hospital = ABChospital()
abc_hospital._init_()
abc_hospital.userInput()
```

Images of Different User Logins and Signups

1. Patient logging in for the first time.

```
Welcome to ABC Hospital Management System
-----------------------------------------
-----------------------------------------
Login or SignUp? (login/signup) login
If you are not having an account, enter 'signup' as the username
Enter Your Username: p-003
Enter Password: 0710000003
You are Logging in for the First Time
Enter A New Username: sumal
Enter A New Password: sumal
You are Authorized
Logged In
Welcome to Patient's Panel of ABC Hospital Management System
['p-003', 'Sumal', '22', 'M', '0710000003', 'Fever', 'd-003', 'Panadol', 'W=10']
```

2. Doctor viewing patient's details

```
Welcome to ABC Hospital Management System
-----------------------------------------
-----------------------------------------
Login or SignUp? (login/signup) login
If you are not having an account, enter 'signup' as the username
Enter Your Username: thilini
Enter Password: thilini
You are Authorized
Logged In
Welcome to Doctor's Panel of ABC Hospital Management System
Do You Wish to Add a New Patient:(yes/no) no
Please Enter the Patient Id to View Data
Enter Patient's Id: p-001
['p-001', 'Nimal', '20', 'M', '0710000001', 'Fever', 'd-001', 'Panadol', 'W=12']
```

3. Nurse viewing patient's details

```
Welcome to ABC Hospital Management System
-----------------------------------------
-----------------------------------------
Login or SignUp? (login/signup) login
If you are not having an account, enter 'signup' as the username
Enter Your Username: hashara
Enter Password: hashara
You are Authorized
Logged In
Welcome to Nurse's Panel of ABC Hospital Management System
Please Enter the Patient Id to View Data
Enter Patient's Id: p-002
['p-002', 'Kamal', '21', 'M', '0710000002', 'Fever', 'd-002', 'Panadol', 'W=11']
```

4. Patient viewing his details.

```
Welcome to ABC Hospital Management System
-----------------------------------------
-----------------------------------------
Login or SignUp? (login/signup)login
If you are not having an account, enter 'signup' as the username
Enter Your Username: nimal
Enter Password: nimal
You are Authorized
Logged In
Welcome to Patient's Panel of ABC Hospital Management System
['p-001', 'Nimal', '20', 'M', '0710000001', 'Fever', 'd-001', 'Panadol', 'W=12']
```

5. A doctor signing up for the first time and adding a patient.

```
Welcome to ABC Hospital Management System
-----------------------------------------
-----------------------------------------
Login or SignUp? (login/signup)signup
SignUp is Stricly Reseicted to ABC Hospital Employees
Please Enter a Username: nuwan
Please Enter a Password: nuwan
Please Enter Your Employee Id: d-004
Please Follow these Instructions when Answering the Next Question
If you are a doctor, answer as 1
If you are a nurse, answer as 2
Which Category are You Falling Into?1
Registration Successful
Please Login
If you are not having an account, enter 'signup' as the username
Enter Your Username: nuwan
Enter Password: nuwan
You are Authorized
Logged In
Welcome to Doctor's Panel of ABC Hospital Management System
Do You Wish to Add a New Patient:(yes/no) yes
Enter Patient's Id: p-004
Enter Patient's Name: Rumal
Enter Patient's Age: 30
Enter Patient's Sex: M
Enter Patient's Mobile: 0710000004
Enter Patient's Illness: Fever
Enter Patient's Prescription: Panadol
Enter Patient's Lab Test Prescription: W=9
Patient's Data:
[p-004,Rumal,30,M,0710000004,Fever,Panadol,W=9]
Data Record Added Successully
```

6. Admin viewing user details.

```
Welcome to ABC Hospital Management System
-----------------------------------------
-----------------------------------------
Login or SignUp? (login/signup) login
If you are not having an account, enter 'signup' as the username
Enter Your Username: admin
Enter Password: admin
You are Authorized
Logged In
Welcome to Admin Panel of ABC Hospital Management System
admin a-000
thilini d-001
nimal p-001
dinesha d-002
kamal p-002
hashara n-001
chamika d-003
sumal p-003
nuwan d-004
p-004 p-004
```

Resource

1. https://github.com/chamikasudusinghe/medicaldata