**Protection of information based on sensitivity & privilege levels**

P. A. Jude Ranidu

170504N

**Contents**

[**Python Source Code** 1](#_Toc39416785)

[**Description of Privilege Levels & Security Features** 8](#_Toc39416786)

[**Annexes** 10](#_Toc39416787)

[**Config File (config.ini)** 10](#_Toc39416788)

[**Data File (data.ini)** 11](#_Toc39416789)

# **Python Source Code**

**Github link -** <https://github.com/JudeRanidu/Security-Assisgnment_Week6>

import configparser

import getpass

from passlib.hash import md5\_crypt

def register():

    config\_parser = configparser.ConfigParser()

    while True:

        username = input("New username: ").strip()

        print("Select User Type: ")

        print("1-staff\n2-patient")

        user\_type = input("Your input:")

        if user\_type == "2":

            user\_type = "patient"

            privilege\_level = "level\_0"

            username = username + " " + "patient"

            config\_parser.read('config.ini')

            sections = config\_parser.sections()

            if username in sections:

                print("Username already taken")

                continue

            break

        elif user\_type == "1":

            username = username + " " + "staff"

            config\_parser.read('config.ini')

            sections = config\_parser.sections()

            if username in sections:

                print("Username already taken")

                continue

            print("select staff type")

            print("1-doctor\n2-nurse\n3-lab\n4-reception\n5-pharmacy")

            staff\_types = ["doctor","nurse","lab","reception","pharmacy"]

            while True:

                staff\_type = input("Your input:")

                user\_type = staff\_types[int(staff\_type)-1]

                if staff\_type == "1":

                    code = input("Enter Verification Code:")

                    if code == "doc1010":

                        privilege\_level = "level\_1"

                        break

                    else:

                        print("Wrong Verification Code")

                        continue

                elif staff\_type == "2":

                    code = input("Enter Verification Code:")

                    if code == "nur2000":

                        privilege\_level = "level\_2"

                        break

                    else:

                        print("Wrong Verification Code")

                        continue

                elif staff\_type == "3":

                    code = input("Enter Verification Code:")

                    if code == "lab3003":

                        privilege\_level = "level\_3"

                        break

                    else:

                        print("Wrong Verification Code")

                        continue

                elif staff\_type == "4":

                    code = input("Enter Verification Code:")

                    if code == "rec4044":

                        privilege\_level = "level\_4"

                        break

                    else:

                        print("Wrong Verification Code")

                        continue

                elif staff\_type == "5":

                    code = input("Enter Verification Code:")

                    if code == "pha5555":

                        privilege\_level = "level\_5"

                        break

                    else:

                        print("Wrong Verification Code")

                        continue

                else:

                    print("Wrong input..Please check again")

                    continue

            break

        else:

            print("Wrong input..Please check again")

            continue

    while True:

        password = getpass.getpass(prompt="New password: ")

        if not len(password) > 0:

            print("Empty password not accepted")

            continue

        else:

            confirm\_password = getpass.getpass(prompt="Confirm Password: ")

            if (password == confirm\_password):

                print("Passwords Matched...")

                break

            else:

                print("Not Matching.Please Re-enter...")

                continue

    hashed\_password = md5\_crypt.hash(password)

    config\_parser = configparser.ConfigParser()

    config\_parser[username] = {"password": hashed\_password,

                               "user\_type": user\_type,

                               "privilege\_level": privilege\_level}

    config\_file = open('config.ini','a')

    config\_parser.write(config\_file)

    config\_file.close()

    print("Registration Successful")

def login():

    while True:

        username = input("Username: ")

        print("Enter User Type: ")

        print("1-staff\n2-patient")

        user\_type = input("Your input:")

        if (user\_type == '1') or (user\_type == '2'):

            if(user\_type == '1'):

                username = username + " staff"

            if(user\_type == '2'):

                username = username + " patient"

            config\_parser = configparser.ConfigParser()

            config\_parser.read('config.ini')

            sections = config\_parser.sections()

            if(username in sections):

                print("\*\*\*user verfied\*\*\*")

                while True:

                    password = getpass.getpass(prompt="Password: ")

                    hashed\_password = config\_parser.get(username, 'password')

                    if md5\_crypt.verify(password, hashed\_password):

                        print("\*\*\*password verified\*\*\*")

                        session(username)

                        break

                    else:

                        print("\*\*\*password is incorrect\*\*\*")

                        continue

                break

            else:

                print("invalid username or user type")

                continue

        else:

            print("Wrong input..Please check again")

            continue

def editSession(patient\_name, pl):

    config\_parser = configparser.ConfigParser()

    config\_parser.read('data.ini')

    while True:

        print("Select a section to Edit: \n 1.personal details \n 2.sickness details \n 3.drug prescriptions \n 4.lab test prespriptions \n 5.back/done")

        option = input("Your input:")

        if option == '1':

            if (pl == "level\_4"):

                details\_old = config\_parser.get(patient\_name, 'personal\_details')

                print('Old Record: ', details\_old)

                print("Enter New Details:")

                details\_new = input('Your input:').strip()

                mode = input("Do you want to keep old records (Y/N): ")

                while True:

                    if (mode == 'y' or mode == 'Y'):

                        details = details\_old + ', ' + details\_new

                        break

                    elif (mode == 'n' or mode == 'N'):

                        details = details\_new

                        break

                    else:

                        print("(Y/N)??")

                        continue

                config\_parser.set(patient\_name, 'personal\_details', details)

                print(config\_parser.get(patient\_name, 'personal\_details'))

                print('Updated Successfully')

            else:

                print('No access to edit this section')

        elif option == '2':

            if (pl == "level\_1"):

                details\_old = config\_parser.get(patient\_name, 'sickness\_details')

                print('Old Record: ', details\_old)

                print("Enter New Details:")

                details\_new = input('Your input:').strip()

                mode = input("Do you want to keep old records (Y/N): ")

                while True:

                    if (mode == 'y' or mode == 'Y'):

                        details = details\_old + ', ' + details\_new

                        break

                    elif (mode == 'n' or mode == 'N'):

                        details = details\_new

                        break

                    else:

                        print("(Y/N)??")

                        continue

                config\_parser.set(patient\_name, 'sickness\_details', details)

                print(config\_parser.get(patient\_name, 'sickness\_details'))

                print('Updated Successfully')

            else:

                print('No access to edit this section')

        elif option == '3':

            if (pl == "level\_1" or pl == "level\_2" or pl == "level\_5"):

                details\_old = config\_parser.get(patient\_name, 'drug\_prescription')

                print('Old Record: ', details\_old)

                print("Enter New Details:")

                details\_new = input('Your input:').strip()

                mode = input("Do you want to keep old records (Y/N): ")

                while True:

                    if (mode == 'y' or mode == 'Y'):

                        details = details\_old + ', ' + details\_new

                        break

                    elif (mode == 'n' or mode == 'N'):

                        details = details\_new

                        break

                    else:

                        print("(Y/N)??")

                        continue

                config\_parser.set(patient\_name, 'drug\_prescription', details)

                print(config\_parser.get(patient\_name, 'drug\_prescription'))

                print('Updated Successfully')

            else:

                print('No access to edit this section')

        elif option == '4':

            if (pl == "level\_1" or pl == "level\_2" or pl == "level\_3"):

                details\_old = config\_parser.get(patient\_name, 'lab\_test\_prescription')

                print('Old Record: ', details\_old)

                print("Enter New Details:")

                details\_new = input('Your input:').strip()

                mode = input("Do you want to keep old records (Y/N): ")

                while True:

                    if (mode == 'y' or mode == 'Y'):

                        details = details\_old + ', ' + details\_new

                        break

                    elif (mode == 'n' or mode == 'N'):

                        details = details\_new

                        break

                    else:

                        print("(Y/N)??")

                        continue

                config\_parser.set(patient\_name, 'lab\_test\_prescription', details)

                print(config\_parser.get(patient\_name, 'lab\_test\_prescription'))

                print('Updated Successfully')

            else:

                print('No access to edit this section')

        elif option == '5':

            break

    config\_parser.write(open('data.ini', 'w'))

def viewSession(patient\_name, pl):

    config\_parser = configparser.ConfigParser()

    config\_parser.read('data.ini')

    while True:

        print("View Options: \n 1-personal details \n 2-sickness details \n 3-drug prescriptions \n 4-lab test prespriptions \n 5-back")

        option = input("Your input:")

        if option == '1':

            print(config\_parser.get(patient\_name, "personal\_details"))

            continue

        elif option == '2':

            print(config\_parser.get(patient\_name, "sickness\_details"))

            continue

        elif option == '3':

            if (pl=='level\_0' or pl=='level\_1' or pl=='level\_2'or pl=='level\_4' or pl=='level\_5'):

                print(config\_parser.get(patient\_name, "drug\_prescription"))

            else:

                print('No access to this section')

            continue

        elif option == '4':

            if (pl=='level\_0' or pl=='level\_1' or pl=='level\_2' or pl=='level\_3'or pl=='level\_4'):

                print(config\_parser.get(patient\_name, "lab\_test\_prescription"))

            else:

                print('No access to this section')

            continue

        elif option == '5':

            break

def staffSession(privilege\_level):

    while True:

        print("Options: \n 1.view or edit patient details \n 2.logout")

        option = input("Your input:")

        if option == "2":

            print("Logging out...")

            break

        elif option == "1":

            patient\_name = input("Enter patient name: ")

            patient\_name = patient\_name + " " + "patient"

            config\_parser = configparser.ConfigParser()

            config\_parser.read('data.ini')

            sections = config\_parser.sections()

            if(patient\_name in sections):

                print("options: \n 1.view details \n 2.edit details")

                option = input('Your input:')

                if option == '1':

                    viewSession(patient\_name, privilege\_level)

                elif option == '2':

                    editSession(patient\_name, privilege\_level)

            else:

                print("No Records")

        else:

            print("Wrong input..Please check again")

            continue

def patientSession(username):

    while True:

        print("Options: \n 1.view history \n 2.logout")

        option = input("Your input:")

        if option == "2":

            print("Logging out...")

            break

        elif option == "1":

            config\_parser = configparser.ConfigParser()

            config\_parser.read('data.ini')

            sections = config\_parser.sections()

            if(username in sections):

                viewSession(username,'level\_0')

            else:

                print("No Records")

        else:

            print("Wrong input..Please check again")

def session(username):

    print("Welcome to your account ")

    config\_parser = configparser.ConfigParser()

    config\_parser.read('config.ini')

    privilege\_level = config\_parser.get(username, "privilege\_level")

    if privilege\_level == 'level\_0':

        patientSession(username)

    else:

        staffSession(privilege\_level)

print("Select the number related to the functionality")

while True:

    print("1-register\n2-login\n3-exit")

    option = input("Your input:")

    if option == "1":

        register()

    elif option == "2":

        login()

    elif option == "3":

        break

    else:

        print("Wrong input..Please check again")

# **Description of Privilege Levels & Security Features**

There are two main user types, patient and staff. Staff include another set of users, doctor, nurse, lab, pharmacy and reception. The users are identified with the usernames and the main user type they belong to.

In order to prevent patients from creating staff accounts the hospital staff is given verification codes. These verification codes are different to the 5 types of staff users as well. This is to prevent one type staff user creating an account of another type of staff user (ex: a reception user creating a doctor account). These verification codes are requested by the system at registration.

Verification codes of different types of users

Doctor type = doc1010

Nurse type = nur2000

Lab type = lab3003

Reception type = rec4044

Pharmacy type = pha5555

The different types of users are given view and edit privileges in the following manner.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **User type** | **Personal details** | | **Sickness details** | | **Drug prescription** | | **Lab test prescription** | |
| **View** | **Edit** | **View** | **Edit** | **View** | **Edit** | **View** | **Edit** |
| Doctor | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Nurse | Yes | No | Yes | No | Yes | Yes | Yes | Yes |
| Lab | Yes | No | Yes | No | No | No | Yes | Yes |
| Pharmacy | Yes | No | Yes | No | Yes | Yes | No | No |
| Reception | Yes | Yes | Yes | No | Yes | No | Yes | No |
| Patient | Yes | No | Yes | No | Yes | No | Yes | No |

As the system with these data is maintained by the hospital for their use, the patients (level\_0) who are outsiders are only given the privilege to view their data. Regarding the sickness details, drug prescriptions and lab test prescriptions, they are assumed to be entered by relevant hospital staff accurately. Therefore, patients are not allowed to edit them but, by any chance if some personal details are entered wrong, they have to go through the reception to edit those details. Therefore, reception (level\_4) is given privilege to edit personal details. Other than that, they have the same privileges as patients.

When you consider doctors (level\_1) and nurses (level\_2) they are given the privilege to view each type of detail of the patient as they represent the highest levels in the hospital staff as well as they directly come in contact with patients. Doctor checks patients and then does the diagnosis of sicknesses, writing drug & lab test prescriptions hence they are given to edit all those data types. Nurses are not given the privilege to edit sickness details as sickness diagnosis is the responsibility of the doctors. But they are given the privilege to edit drug prescriptions and lab test prescriptions.

When you consider lab(level\_3) and pharmacy(level\_5) they both are given the privilege to view personal details and sickness details. Sickness details are required by both pharmacy and lab to verify their respective prescriptions (drug & lab test). Then pharmacy is given the privilege only to edit drug prescriptions and lab is given the privilege only to edit lab test prescriptions as they are their respective fields of expertise.

Following are some account details created for testing.

|  |  |  |
| --- | --- | --- |
| **Username** | **Password** | **User type** |
| ranidu | pswd | Doctor |
| saman | pswd | Nurse |
| wimala | def | Lab |
| dilan | bond | Reception |
| dilki | abc | Pharmacy |
| kasun | verify | Patient |
| minoma | check | Patient |
| malkanthi | bns | Patient |

# **Annexes**

## **Config File (config.ini)**

[saman staff]

password = $1$NpNdZS1E$HB.J5T91uyBwgGGRT922b.

user\_type = nurse

privilege\_level = level\_2

[ranidu staff]

password = $1$NvN2hlbr$RxJIJHH5gxqef1G22knAc.

user\_type = doctor

privilege\_level = level\_1

[dilan staff]

password = $1$RMxlhT8l$x2rB90YoUf4hepaGiiVdD0

user\_type = reception

privilege\_level = level\_4

[kasun patient]

password = $1$lcUSrDVd$9k6JNpvRZC/7oEWCYr2DV.

user\_type = patient

privilege\_level = level\_0

[dilki staff]

password = $1$CqUfz1.j$vLxpRy29Vnq2s6XOIblBX0

user\_type = pharmacy

privilege\_level = level\_5

[wimala staff]

password = $1$wuzgmyZX$JGxrff44XzIAT6Yrggyot1

user\_type = lab

privilege\_level = level\_3

[minoma patient]

password = $1$UrLzy/Gk$pID3WYBboEO6Wsp96nuQt.

user\_type = patient

privilege\_level = level\_0

[malkanthi patient]

password = $1$PF3zLW1p$5cNQQjYHISY.mLCX.EExG1

user\_type = patient

privilege\_level = level\_0

## **Data File (data.ini)**

[minoma patient]

personal\_details = Minoma Perera

sickness\_details = Viral Flu

drug\_prescription = Panadol

lab\_test\_prescription = Antigen Test

[malkanthi patient]

personal\_details = Malkanthi Silva

sickness\_details = Gastritis

drug\_prescription = Digene

lab\_test\_prescription = Scan

[kasun patient]

personal\_details = Kasun Jayakody

sickness\_details = Cough

drug\_prescription = Amoxil

lab\_test\_prescription = Blood Test