**Assignment**

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

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# Python Code

from configparser import ConfigParser

import getpass

from passlib.hash import md5\_crypt

func = 1

config\_filename = 'config.ini'

datafile\_filename = 'data.ini'

config\_parser = ConfigParser()

def open\_config(config\_filename):

config\_file = open(config\_filename, 'a')

return config\_file

def register(username, hashed\_password, user\_type):

config\_file = open\_config(config\_filename)

data\_file = open\_config(datafile\_filename)

config\_parser = ConfigParser()

if user\_type == 'staff':

if username.split('@')[-1] == 'reception':

# can read peronal and sickness and write none,personal of himself

privilege\_level = 1

elif username.split('@')[-1] == 'pharmacy':

# can access peronal, sickness, drugs,personal of himself

privilege\_level = 2

elif username.split('@')[-1] == 'lab':

# can read peronal, sickness, reports and write reports,personal of himself

privilege\_level = 3

elif username.split('@')[-1] == 'nurse':

# can read peronal, sickness, drugs, reports and write personal of himself

privilege\_level = 4

elif username.split('@')[-1] == 'doc':

# can read peronal, sickness, drugs, reports and write sickness, drugs,personal of himself

privilege\_level = 5

elif user\_type == 'patient':

# can read peronal, sickness, drugs, reports and write personal of himself

privilege\_level = 0

config\_parser['User'+' ' + username.split('@')[0]] = {'username': username,

'hashed\_password': hashed\_password,

'user\_type': user\_type,

'privilege\_level': privilege\_level}

config\_parser.write(config\_file)

config\_file.close()

config\_parser['User'+' ' + username.split('@')[0]] = {'personal\_details': '',

'sickness\_details': '',

'drug\_prescription': '',

'lab\_test\_prescription': ''}

config\_parser.write(data\_file)

data\_file.close()

return True

def check\_username(username, user\_type):

if username == '':

print('Invalid Username')

return True

config\_parser.read(config\_filename)

section = 'User' + ' ' + username.split('@')[0]

# print(section)

if section in config\_parser.sections():

print('Records Found')

return True

else:

if user\_type == 'staff':

if username.split('@')[-1] in ['doc', 'nurse', 'lab', 'pharmacy', 'reception']:

return False

else:

print('Invalid Username')

return True

if user\_type == 'patient':

if username.split('@')[-1] in ['doc', 'nurse', 'lab', 'pharmacy', 'reception']:

return True

else:

print('You can not use this username')

return False

def validate\_user(key):

given\_key = 'given key'

if key == given\_key:

return False

else:

return True

def login(username, password):

config\_parser.read(config\_filename)

section = 'User' + ' ' + username.split('@')[0]

if section in config\_parser.sections():

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

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

print('Login Successful')

return section, True

else:

print('Inavlid Credentials')

return None, False

else:

print('No Records Found')

return None, False

def patient\_details(current\_user):

if current\_user == None:

print('You should login to continue')

return False

data\_file = open\_config(datafile\_filename)

config\_parser = ConfigParser()

config\_parser.read(config\_filename)

privilege\_level = config\_parser.get(current\_user, 'privilege\_level')

# print(privilege\_level)

current\_username = config\_parser.get(current\_user, 'username')

personal\_details = ''

sickness\_details = ''

drug\_prescription = ''

lab\_test\_prescription = ''

while True:

print('Enter the username of the patient: ', end='')

patient\_username = input().strip().split('@')[0]

# print('patient\_username')

if check\_username(patient\_username, 0):

user = 'User' + ' ' + patient\_username.split('@')[0]

username = config\_parser.get(user, 'username')

break

else:

print('No Records')

config\_parser = ConfigParser()

config\_parser.read(datafile\_filename)

print('Enter the section you want(personal, sickness, drugs, lab): ', end='')

section = input().strip()

print('Enter the process you want(read, write): ', end='')

process = input().strip()

if section == 'personal':

if process == 'write':

if username == current\_username:

print('Enter details: ')

personal\_details\_old = config\_parser.get(

user, 'personal\_details')

personal\_details = input().strip()

personal\_details = personal\_details\_old + ', ' + personal\_details

config\_parser.set(user, 'personal\_details', personal\_details)

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

print('Updated Successfully')

else:

print('You do not have permission to do this')

if process == 'read':

# print('here')

if username == current\_username or privilege\_level == '1' or privilege\_level == '2' or privilege\_level == '3' or privilege\_level == '4' or privilege\_level == '5':

personal\_details = config\_parser.get(user, 'personal\_details')

print(personal\_details)

else:

print('You do not have permission')

elif section == 'sickness':

if process == 'write':

if privilege\_level == '5':

print('Enter details: ')

sickness\_details\_old = config\_parser.get(

user, 'sickness\_details')

sickness\_details = input().strip()

sickness\_details = sickness\_details\_old + ', ' + sickness\_details

config\_parser.set(user, 'sickness\_details', sickness\_details)

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

print('Updated Successfully')

else:

print('You do not have permission to do this')

elif process == 'read':

if username == current\_username or privilege\_level == '1' or privilege\_level == '2' or privilege\_level == '3' or privilege\_level == '4' or privilege\_level == '5':

sickness\_details = config\_parser.get(user, 'sickness\_details')

print(sickness\_details)

else:

print('You do not have permission')

elif section == 'drugs':

if process == 'write':

if privilege\_level == '5':

print('Enter details: ')

drug\_prescription\_old = config\_parser.get(

user, 'drug\_prescription')

drug\_prescription = input().strip()

drug\_prescription = drug\_prescription\_old + ', ' + drug\_prescription

config\_parser.set(user, 'drug\_prescription', drug\_prescription)

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

print('Updated Successfully')

else:

print('you do not have permission')

elif process == 'read':

drug\_prescription = config\_parser.get(user, 'drug\_prescription')

if username == current\_username or privilege\_level == '5' or privilege\_level == '4' or privilege\_level == '2':

print(drug\_prescription)

else:

print('you do not have permission')

elif section == 'lab':

if process == 'write':

if privilege\_level == '3':

print('Enter details: ')

lab\_test\_prescription\_old = config\_parser.get(

user, 'lab\_test\_prescription')

lab\_test\_prescription = input().strip()

lab\_test\_prescription = lab\_test\_prescription\_old + ', ' + lab\_test\_prescription

config\_parser.set(

user, 'lab\_test\_prescription', lab\_test\_prescription)

(config\_parser.get(user, 'lab\_test\_prescription'))

print('Updated Successfully')

else:

print('you do not have permission')

elif process == 'read':

lab\_test\_prescription = config\_parser.get(

user, 'lab\_test\_prescription')

if username == current\_username or privilege\_level == '5' or privilege\_level == '4' or privilege\_level == '3':

print(lab\_test\_prescription)

else:

print('you do not have permission')

else:

return False

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

data\_file.close()

return True

while (func != 0):

print("function (register, login, details or 0) :")

func = input().strip()

logged = False

if func == "register":

print('/\*\*\*\*\*\*\*\*\*\*\*User Registration\*\*\*\*\*\*\*\*\*/')

print('username: ', end='')

username = input().strip()

password = ''

confirm\_password = 'aa'

user\_type = 'none'

user = '0'

while True:

if check\_username(username, user\_type):

print('username: ', end='')

username = input().strip()

else:

break

password = getpass.getpass(prompt='password')

confirm\_password = getpass.getpass(prompt='confirm\_password')

while True:

if password != confirm\_password:

password = getpass.getpass(prompt='password')

confirm\_password = getpass.getpass(prompt='confirm\_password')

print('Not matching')

else:

break

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

print('user\_type (staff or patient): ', end='')

user\_type = input().strip()

if user\_type == 'staff':

while True:

print(

'staff username(username@doc|nurse|lab|pharmacy|reception): ', end='')

username = input().strip()

if check\_username(username, user\_type):

continue

else:

print('Key: ', end='')

key = input().strip()

if validate\_user(key):

continue

else:

break

break

register = register(username, hashed\_password, user\_type)

if register:

print('Registration Successfull')

else:

print('Can not regiter')

print('/\*\*\*\*\*\*\*\*\*\*\*User Login\*\*\*\*\*\*\*\*\*/')

user, logged = login(username, password)

print('/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/')

patient\_details(user)

elif func == "login":

while True:

print('/\*\*\*\*\*\*\*\*\*\*\*User Login\*\*\*\*\*\*\*\*\*/')

print('username: ', end='')

username = input().strip()

password = getpass.getpass(prompt='password')

user, logged = login(username, password)

if logged:

break

else:

continue

print('/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/')

patient\_details(user)

elif func == "details":

print('/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/')

if (logged == '1'):

print('login first')

else:

patient\_details(user)

elif func == '0':

print('Bye')

break

else:

print('Wrong Input')

# How the privileges are given

* Users are identified with their user type (staff and patient) and the username.
* In staff there are several users: reception, pharmacy, lab, nurse and doctor. Staff users have their own key given by the hospital admin. Types of staff users are identified from the username format.
* All users have their own medical details record including personal details, sickness details, drugs prescription and lab test prescription.
* Any user can edit and read their personal details.
* Patient user can read his medical details and can’t edit them.
* In the staff category,
* Reception user can read personal and sickness details of any user and can’t edit anything.
* Pharmacy user can read personal, sickness, drugs details of any user and can’t edit anything.
* Lab user can read personal, sickness and reports of any user and can edit test prescription of any user.
* Nurse user can read personal, sickness, drugs and test sections of any user and can write sickness details.
* Doctor user can read personal, sickness, drugs and test sections of any user and can write sickness and drugs sections of any user.

Username format for patient – patient1@abc

Username format for staff - reception1@reception, pharmacy1@pharmacy, lab1@lab, nurse1@nurse, doc1@doc

Assumption: For the staff, usernames were given with a key, before from the hospital administration.

# Annex

## Config file

[User patient1]

username = patient1

hashed\_password = $1$WHPN.v/g$CxJDUSvJBzQaWC5ngqNi./

user\_type = patient

privilege\_level = 0

[User doc1]

username = doc1@doc

hashed\_password = $1$HMc8Qxmp$5LhnmlYfJY0AG2/rVccjl0

user\_type = staff

privilege\_level = 5

[User nurse1]

username = nurse1@nurse

hashed\_password = $1$Q41Fj41o$j7YU4K3kLOQ8Z6vC2AoJS.

user\_type = staff

privilege\_level = 4

[User lab1]

username = lab1@lab

hashed\_password = $1$4TsLYVkw$jOtydmasrBKs5b6Bg8/810

user\_type = staff

privilege\_level = 3

[User pharmacy1]

username = pharmacy1@pharmacy

hashed\_password = $1$J3Wmg0WO$qAfAWfExGg17B1dRe9tHe.

user\_type = staff

privilege\_level = 2

[User reception1]

username = reception1@reception

hashed\_password = $1$HFvl3e73$hn6w.VGJL4kaHtzcCSyf7/

user\_type = staff

privilege\_level = 1

[User patient2]

username = patient2

hashed\_password = $1$1WL8.lfw$2JKbFn3uMoKt5C48idJg51

user\_type = patient

privilege\_level = 0

[User doc2]

username = doc2@doc

hashed\_password = $1$ksa1Rr0W$lGN9TXeDHFIuX2hZzhyqn.

user\_type = staff

privilege\_level = 5

## Data file

[User patient1]

personal\_details = info1, info2

sickness\_details = sickness1, sickness2

drug\_prescription = drug1, drug2

lab\_test\_prescription = lab1, lab2, lab1, lab2

[User doc1]

personal\_details =

sickness\_details =

drug\_prescription =

lab\_test\_prescription =

[User nurse1]

personal\_details =

sickness\_details =

drug\_prescription =

lab\_test\_prescription =

[User lab1]

personal\_details =

sickness\_details =

drug\_prescription =

lab\_test\_prescription =

[User pharmacy1]

personal\_details =

sickness\_details =

drug\_prescription =

lab\_test\_prescription =

[User reception1]

personal\_details =

sickness\_details =

drug\_prescription =

lab\_test\_prescription =

[User patient2]

personal\_details = , info1, info2

sickness\_details =

drug\_prescription = , drug1, drug2

lab\_test\_prescription =

[User doc2]

personal\_details =

sickness\_details =

drug\_prescription =

lab\_test\_prescription =

## Test Runs

### Test run 1

1. Register as a patient
2. username: patient2
3. password: abc
4. Login
5. Trying to read patient 1 personal details
6. Reads his details
7. Writes to his details
8. Reads his details
9. Exit

>python app.py

function (register, login, details or 0) :

register

/\*\*\*\*\*\*\*\*\*\*\*User Registration\*\*\*\*\*\*\*\*\*/

username: patient2

password

confirm\_password

user\_type (staff or patient): patient

Registration Successfull

/\*\*\*\*\*\*\*\*\*\*\*User Login\*\*\*\*\*\*\*\*\*/

Login Successful

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient1

Records Found

Enter the section you want(personal, sickness, drugs, lab): personal

Enter the process you want(read, write): read

You do not have permission

function (register, login, details or 0) :

details

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient2

Records Found

Enter the section you want(personal, sickness, drugs, lab): personal

Enter the process you want(read, write): read

function (register, login, details or 0) :

details

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient2

Records Found

Enter the section you want(personal, sickness, drugs, lab): personal

Enter the process you want(read, write): write

Enter details:

info1, info2

, info1, info2

Updated Successfully

function (register, login, details or 0) :

details

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient2

Records Found

Enter the section you want(personal, sickness, drugs, lab): personal

Enter the process you want(read, write): read

, info1, info2

function (register, login, details or 0) :

0

Bye

### Test run 2

1. Try to register as doc1 which is existing
2. Register as doc2 with hospital username
3. username: doc2@doc
4. key = given key
5. password: a
6. Read patient 2 personal details
7. Writes drug details to patient2 details
8. Reads patient 2 drug details
9. exit

>python app.py

function (register, login, details or 0) :

register

/\*\*\*\*\*\*\*\*\*\*\*User Registration\*\*\*\*\*\*\*\*\*/

username: doc1

Records Found

username: doc2

password

confirm\_password

user\_type (staff or patient): staff

staff username(username@doc|nurse|lab|pharmacy|reception): doc1@doc

Records Found

staff username(username@doc|nurse|lab|pharmacy|reception): doc2@doc

Key: given key

Registration Successfull

/\*\*\*\*\*\*\*\*\*\*\*User Login\*\*\*\*\*\*\*\*\*/

Login Successful

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient2

Records Found

Enter the section you want(personal, sickness, drugs, lab): personal

Enter the process you want(read, write): read

, info1, info2

function (register, login, details or 0) :

details

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient2

Records Found

Enter the section you want(personal, sickness, drugs, lab): drugs

Enter the process you want(read, write): write

Enter details:

drug1, drug2

, drug1, drug2

Updated Successfully

function (register, login, details or 0) :

details

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient2

Records Found

Enter the section you want(personal, sickness, drugs, lab): drugs

Enter the process you want(read, write): read

, drug1, drug2

function (register, login, details or 0) :

0

Bye

### Test run 3

1. login as reception user
2. username: recception1
3. password: a
4. reads his sickness details
5. Tries to write into his sickness details
6. exit

>python app.py

function (register, login, details or 0) :

login

/\*\*\*\*\*\*\*\*\*\*\*User Login\*\*\*\*\*\*\*\*\*/

username: reception1@reception

password

Login Successful

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient1

Records Found

Enter the section you want(personal, sickness, drugs, lab): sickness

Enter the process you want(read, write): read

sick1,sick2

function (register, login, details or 0) :

details

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient1

Records Found

Enter the section you want(personal, sickness, drugs, lab): sickness

Enter the process you want(read, write): write

You do not have permission to do this

function (register, login, details or 0) :

0

Bye

### Test run 4

1. login as a lab user
2. username: lab1@lab
3. password: a
4. writes to patient 1 lab details
5. reads patient 1 lab details

>python app.py

function (register, login, details or 0) :

login

/\*\*\*\*\*\*\*\*\*\*\*User Login\*\*\*\*\*\*\*\*\*/

username: lab1@lab

password

Login Successful

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient1

Records Found

Enter the section you want(personal, sickness, drugs, lab): lab

Enter the process you want(read, write): write

Enter details:

lab1 , lab2

Updated Successfully

function (register, login, details or 0) :

details

/\*\*\*\*\*\*\*\*\*\*\*Patient Details\*\*\*\*\*\*\*\*\*/

Enter the username of the patient: patient1

Records Found

Enter the section you want(personal, sickness, drugs, lab): lab

Enter the process you want(read, write): read

, lab1 , lab2

function (register, login, details or 0) :

0

Bye