Software Engineering Lab

Spring 2024

Lab-4: Software Application Development Using Python

Learning objectives:
The following are the major learning objectives with this assignmemt.

- How class can be defined. Learn the concept of encapsulation and how to create objects of a class.
- How inheritance of classes can be defined. Learn the concept of inheritance in object-oriented design.
- Learn how objects of a class can be stored in a list so that the objects can be made persistent.
- Learn how objects stored in a list can be retrieved and then be manipulated.
- What is GUI (Graphical User Interface)? How GUI for a use case (also called faunctionality of a softweare) can be designed and implemented.
- What are the different elements in a GUI and interaction of GUI components to the event to be executed.

Practice problem:
To learn the above aspects, a small system is proposed, so that your learning can be exercised.

The following class hierarchy (see Fig. 1) is known in a small academic unit. Note that the attributes and permissible operations are not mentioned explicitly. You may decide on the appropriate member elements and thus give a complete definition of each class in the hierarchy.

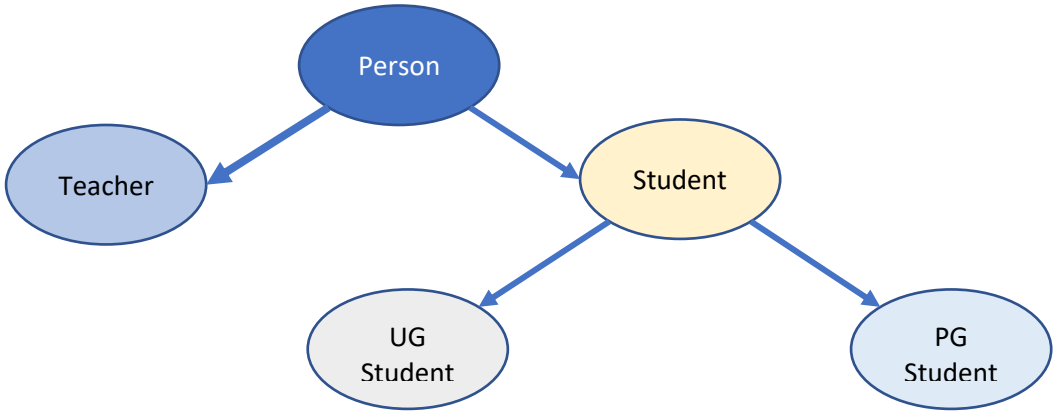

Fig. 1: Class hierarchy of academic unit

Given the above, the task is to develop a software system. The software would store the records of any member of the academic unit. More precisely, the software will support the following activities.

1. **User registration** (new user enrolment)
   User registration includes setting a *User ID* and *Password*
   User ID: It should be the active email address of the user (or anything else the developer can decide)

Password: A valid password should satisfy the following:

a) It should be within 8-12 character long.
b) It should contain at least one upper case, one digit, and one lower case.
c) It should contains one or more special character(s) from the list [! @ # $ % & *]
d) No blank space will be allowed.

2. **Sign-in to the system**
   The system should authenticate to check if a user is legitimate or not. A maximum of three attempts will be allowed for the verification; after the three wrong attempts, the account will be deactivated.

3. **Edit/ Update the user's profile**
   An authorised user will be allowed to fill in the user's data. Also, it allows to edit (modify, update) user's data.

4. **Deregistration request**
   A user may be allowed to submit the deregistration request. On successful submission of the request, the user's account will be inactive (logically deleted).

Do the following:

- Define classes as per the given class hierarchy (See Fig. 1).
- Decide the structure of the list, which can be used to store records of the different classes.
- Develop the user interfaces for the system with the use cases as mentioned.
- Link the GUI elements to the program at the back-end.

Hints:

- The software should be developed using Python programming.
- For the implementation of user interfaces, you can follow the **Tkinter** (not limited to) in Python. The *Tkinter* provides a **Tk GUI toolkit** and is Python's de facto standard GUI development tool.
- In this lab, you can precisely understand your job to be done and check the programming facilities (in Python) that you can leverage.
- Your implementation with a report containing the details of the implementation and screenshots of the GUIs under different scenarios.
- Complete this practice latest by 29.01.2024 and submit your code implementation and report to the Moodle server latest by 30.01.2024 (FN).