Workshops Enrollment System
Project Report

ZHANG Wengyu `21098431d`
CHEN Derun `21098424d`
YE Haowen `21098829d`

Computational Thinking and Problem Solving (COMP1002) - Project Group 2

1 Introduction

This document describes the process of solving the problem Topic 3 by group 2. The project is part of the course Computational Thinking and Problem Solving (COMP1002) at PolyU.

2 Problem description

The aim of Topic 3 is providing a **Workshop Enrollment System** for students to enroll workshops as well as for administrators to manage. For students, they can enroll workshops, cancel enrollment, check enrollment, and search and sort workshops. For administrators, they have access to add a new workshop, update workshops, and search and sort workshops.

A workshop contains a) a unique **ID**, b) **Title**, c) **Location**, d) **Date**, e) **Time**, f) **Quota**, and g) **Remaining**.

The login function is also required to the system with the correct ID and corresponding password, no matter administrators or students.

3 Data abstraction

- We use multiple text files to store all workshops and each student's enrollments:
  - `workshop.txt`: stores all workshops;
  - `[sID].txt`: stores all workshop enrolled by a student with `[sID]`;

  For each line in above 2 **.txt** file, the format is pre-designed as **ID:info1,info2,...**, like:

  `000001:workshop1 pq604a 2021/11/22 1200-1300 100 100`

- Furthermore, we use text files for login:
  - `administrator.txt`: stores user name and password of all administrators for login verification;
  - `student.txt`: stores user name and password of all students for login verification;

Due to the ID of each workshop is unique and immutable, and each workshop has its information, we use the **Dictionary** data type to store the pair of these data. And **List** data type is used to store the information of a workshop which is mapped by the workshop ID. Moreover, **Dictionary** can be retrieved quickly by the key, and **List** is mutable which is handy to update. Therefor a nested **Dictionary** with a **List** as value is the main data structure used throughout the whole project.

4 Python implementation of the data types

- For nested **Dictionary** data model, representing workshop information, we convert data from text file to

  `{workshop ID:[workshop info1, info2,...]}`

  For example, from

  `"000001:workshop1 pq604a 2021/11/22 1200-1300 100 100"` **to**

  `{"000001":["workshop1", "pq604a", "2021/11/22", "1200-1300", "100", "100"]}`

- Firstly, using **split()** to split the read string by **":"**, and the string will become a **list** with two elements, element of the first index is ID and second is other information [**ID,other information**]. After that, since the content in **list[1]** is still a string with **blank**, so using split again to convert it to a new list [**ID,[other information**]]. Then using append to store **all lines**. Finally, using **dict()** to convert it as **{ID:[other information]}** (See Figure 1).

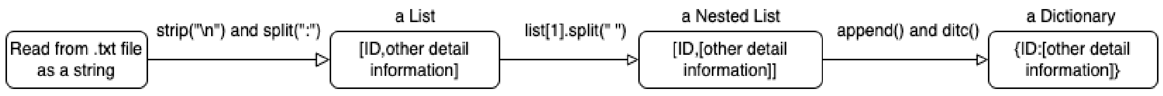

Read from .txt file as a string
strip("\n") and split(":")
a List
[ID,other detail information]
list[1].split(" ")
a Nested List
[ID,[other detail information]]
append() and ditc()
a Dictionary
{ID:[other detail information]}

Figure 1: Data abstraction

5 Modular Design

5.1 Login model

- We set a complete account login system for new users and exist users. Entering the user system, it will ask you to choose whether administrator or student identity to login. After choosing the identity, the user is supposed to enter user name and password. a) For student, a successful login will happen with **exist user name and correct password**. During this section, the system will check whether the name exists in **student.txt** file or not initially. If not, the system will lead to **registering** section and ask user to register a new account. After successfully entering a **new** user **name** and password in register section, user will back to login section to login the registered account. If user does not choose to create a new account, the system will back to login section immediately. b) For administrator, the only difference is there is **no register** section. At the same time, each user, no matter student or administrator, has a choice of entering a wrong password **three times** and the system will be force **exited** when inputting the wrong password more than three times(See Figure2).

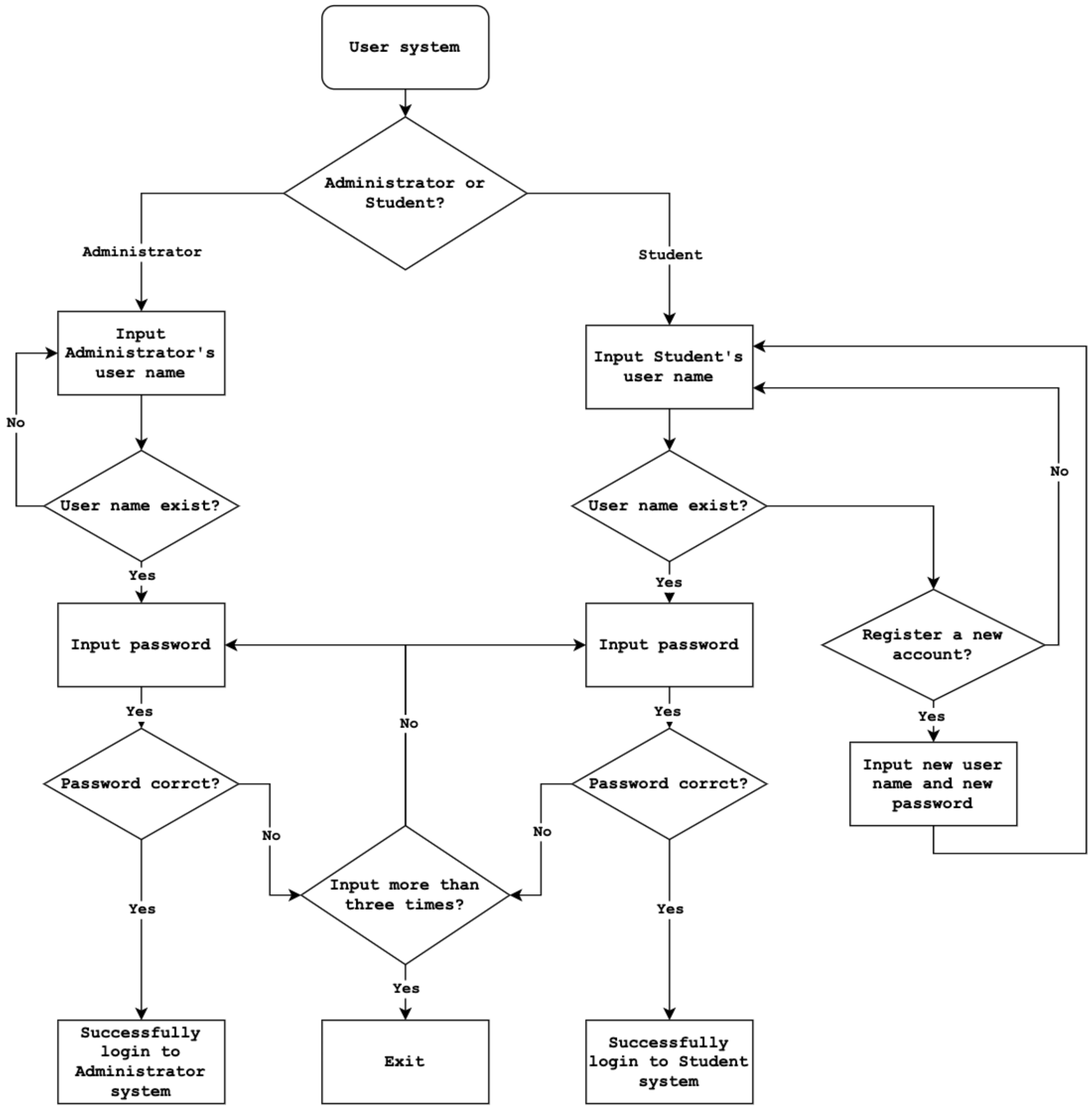

User system
Administrator or Student?
Administrator
Student
Input Administrator's user name
User name exist?
No
Yes
Input password
Yes
Password corrct?
No
Yes
Successfully login to Administrator system
Input Student's user name
User name exist?
Yes
Input password
Yes
Password corrct?
No
Yes
Successfully login to Student system
Register a new account?
No
Yes
Input new user name and new password
Input more than three times?
No
Yes
Exit

Figure 2: Main Procedure Flowchart

5.2 Key Functions

5.2.1 Function for Administrator

- `addWs(inData)`: Add a new workshop with `inData` into the workshop storage by administrator. The unique ID of the new workshop is generated by system automatically.
- `deleteWs(wID)`: Delete a workshop with a ID as `wID` from the storage by the administrator.
- `updateWorkShop(wID,inData,Index)`: Update the information of a workshop by administrator.
  - `wID`: the ID of the workshop to be updated;
  - `inData`: the new information to be updated into the workshop;
  - `Index`: which information in the workshop need to be updated - 0: Name; 1: Location; 2: Date; 3: Time; 4: Quota; 5: Remaining. For example, **updateWorkShop(wID,inTitle,0)** can be used to update the title of a workshop.
- `Retrieval function`: Based on the **searchEngine**(see 5.3 Search Engine), This function returns corresponding workshop as a string based on the entering parameter(e.g., workshop ID, Title, Location,

Date, Time, Quota, and Remaining).

5.2.2 Function for Student

- `eroll(sID,wID)` : for a student-**sID** to enroll a workshop-**wID**. When remaining positions ≤ 0, or the time of the workshop-**wID** is overlapped, system will not allow this enrollment.
- `cancel(sID,wID)` : for a student-**sID** to cancel a enrolled workshop-**wID**. When the workshop has not been enrolled by student, the system will not allow the cancellation.
- `listEnrolledWs(sID)`: list out all workshops enrolled by the student-**sID**.
- `Retrieval function`: Based on the class **searchEngine**(see 5.3 Search Engine), this function will return the corresponding workshop as a string based on the entering parameter(e.g., workshop ID, Title, Location, Date, Time, and Remaining, student have no access to the number of Quota).

5.3 Search Engine

- A class of `searchEngine` is designed for **Retrieval** workshops, which has 7 functions for searching corresponding workshop based on **workshop ID, Title, Location, Date, Time, Quota or Remaining number**. And each function will return a string **outStr**, for showing out the corresponding information if possible. Example of searching based on **workshop location**:
-
```
input:
    inDict: a dictionary contains all workshop information
    inLocation: the target location to search
outList: a list stores all found workshops for output
Repeat get element from inDict as item
    if the location of item is equal to inLocation:
        append the item workshop into the outList
Until got all elements
if the outList is empty, output "NO Found!"
else output the outList
```

6 Extra function: Register, Search, Sort function and Graphic User Interface

- `Search Function`: Our group provides a search function not only for administator but also for student based on class **searchEngine**. This function provides a retrieve platform for student to search workshop based on [i]**ID;** [tit]**:Title;** [l]**Location;** [d]**Date;** [t]**Time;** [r]**Remaining** apart from **quota**.
- `Sort Function`: This function provides a better experience on searching and listing out workshops, which is based on **Bubble Sort**. The function `sort(inDict,inBase,inOrder)` will return a sorted **inDict** based on **inBase** section in the **inOrder** order. This function returns a **ascending order** search result based on **workshop ID** by default.
    - `inBase`: refers to the sort basis. It has **(0,1,2,3,4,5)** 6 values, pointing to **Title, Location, Date, Time, Quota and Remaining** of a workshop, respectively.

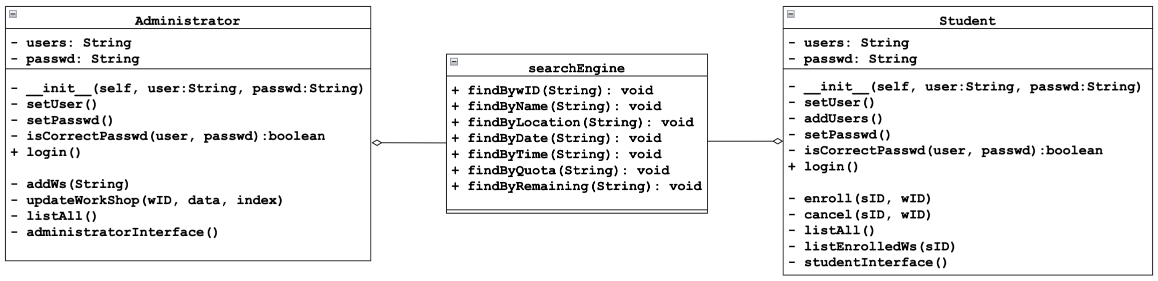
  - `inOrder`: refers to the sort order. It contains boolean value `True` for **[i]** **increasing** order and `False` for **[d]** **decreasing** order.

    For example, `findByName(inDict,0,True)` will search and return an **increasing order** dictionary based on workshop **name** from the `inDict` dictionary.

- `Register Function`: We provide register function for student who does not have an account for the system(See in 5.1 Login model).

- `Graphic User Interface`: Our group implement **Graphic User Interface(GUI)** successfully based on the `tkinter` package [1]. The GUI provides administrators and students a better operating experience, as well as an intuitive view on input and output when using the Workshop Enrollment System

7 Object-oriented Design



Administrator
- users: String
- passwd: String
- __init__(self, user:String, passwd:String)
- setUser()
- setPasswd()
- isCorrectPasswd(user, passwd):boolean
+ login()
- addWs(String)
- updateWorkShop(wID, data, index)
- listAll()
- administratorInterface()
searchEngine
+ findBywID(String): void
+ findByName(String): void
+ findByLocation(String): void
+ findByDate(String): void
+ findByTime(String): void
+ findByQuota(String): void
+ findByRemaining(String): void
Student
- users: String
- passwd: String
- __init__(self, user:String, passwd:String)
- setUser()
- addUsers()
- setPasswd()
- isCorrectPasswd(user, passwd):boolean
+ login()
- enroll(sID, wID)
- cancel(sID, wID)
- listAll()
- listEnrolledWs(sID)
- studentInterface()

Figure 3: Object-oriented Design

According to the project description, the **Workshops Enrollment System** can be accessed by different administrators and students, so we abstract information form them and mainly use the **encapsulation** of Object-oriented(OO) Design in the program[2]. Overall, we need 3 objects - **administrator, student, search engine**, therefore, we create 3 corresponding classes to encapsulate their variables and functions(See Figure 3).

For `administrator, student` class, we encapsulate two variables - **users name** and **password** into them, constructed by the initializer when a administrator or student is created in the project. These two variable not only can be used in the login verification, but also indicates the target .txt file modified by administrator or student. Furthermore, functions are also encapsulated in these classes, including login functions, file IO functions, and command line interface functions.

For `search engine` class, we encapsulate all searching functions into it, which can be easily used by administrators and students for retrieval.

References

[1] Python Software Foundation, *Graphical User Interfaces with Tk*, 2021, last updated on Nov 30, 2021. [Online]. Available: https://docs.python.org/3/library/tk.html

[2] Python Software Foundation, *Classes*, 2021, last updated on Nov 30, 2021. [Online]. Available: https://docs.python.org/3/tutorial/classes.html