Java Fundamentals

Week 02 – A university project

In this assignment, we will develop and administration system for a university. The system allows users (students, teachers and managers of the university) to access specific features of the application.

The goal of this assignment is to learn, and afterwards discuss, how to come up with a good object-oriented solution. So make sure to use:

- Several classes (be mindful that the UI should also consist of multiple classes).
- Inheritance where possible.
- Mark classes as abstract if they should not be instantiated.
- Encapsulation everywhere. No public variables, but only getters and setters for variables accessed outside of the class. No public methods if they are not used outside of the class.
- Polymorphism when possible.

To avoid spending time on UI design and programming, the system will have a simple command line interface.

To avoid spending time on designing relational databases, connections and using database tools, objects will be stored in memory, and the test data is initialized in code.

Before starting the assignment, read through the entire document. Then make a list of all the classes you will need, including their members (variables and methods). Bring the list with you to the next lecture (as a digital document).

Identify any challenges that make it difficult to come up with the exact classes you need and write them down. We will discuss these during the next lecture!

Then, develop the system. You are of course allowed to deviate from your initial list of classes.

Functional design

User login

Before being able to use the application, users have to login as shown below. By successful login, the system searches for the user. If the user is found, the system checks his/her access level and the available menu options appear.


```
Enter username: emma
Enter password: emma12
```

There are three levels of access: Basic, Editor and Admin. By default, students access level is basic, teachers access is editor and managers are admins.

Student (basic access level)

Students have the following three options:

```
S. Display Students  | T. Display Teachers  | X. Exit  |

 Please, enter a choice:
```

By entering the letter "S" the list of the students appears as shown below:

```
S. Display Students  | T. Display Teachers  | X. Exit  |

 Please, enter a choice: s


 LIST OF STUDENTS

Id      FirstName    LastName     Birthdate     Age    Group
**      *********    ********     *********     ***    *****
1       Emma         Smith        12/04/1997    23     IT-02-A
2       Jack         Brown        08/07/1993    27     IT-02-A
3       Michael      Garcia       11/01/1999    21     IT-02-A
4       Lisa         Jones        04/29/2000    20     IT-02-A
5       John         Miller       10/27/2001    19     IT-02-A
6       Linda        Martinez     01/17/2002    18     IT-02-A
7       Richard      Davis        09/22/1997    23     IT-02-A
8       Mark         Lopez        12/09/1996    24     IT-02-A
9       Debora       Hernandez    02/25/1995    25     IT-02-A
10      Rick         Moore        03/16/2000    20     IT-02-A

S. Display Students  | T. Display Teachers  | X. Exit  |

 Please, enter a choice:
```

By choosing the option "T" the list of the teachers appears, see the picture below!

```
S. Display Students  | T. Display Teachers  | X. Exit  |

 Please, enter a choice: t


 LIST OF TEACHERS

Id      FirstName    LastName     Birthdate     Age
**      *********    ********     *********     ***
11      David        Taylor       06/15/1965    55
12      Sophy        Anderson     01/06/1987    33
13      James        Jordon       03/19/1956    64
14      Susan        Jackson      12/25/1978    42
15      Mary         Lee          09/04/1971    49

S. Display Students  | T. Display Teachers  | X. Exit  |

 Please, enter a choice:
```

By entering the letter "X" the program is terminated.

```
S. Display Students  | T. Display Teachers  | X. Exit  |

 Please, enter a choice: x


 Leaving the program now ...
```

Teacher (editor access level)

Teachers can access all the functionalities that are available for the students with the following extra options.

- Add Students
- Display Reports
- Display Report Details
- Add and Modify Reports

Once the system recognizes an account as a teacher (editor access), the following features will be available:

By entering the letter "A" teachers can add new students to the system.

The new student now appears on the list of the students which can be accessed by entering the letter "S".

```
Enter group: IT_02_B
The data was successfully added!

S. Display Students  | T. Display Teachers  | A. Add Students  | R. Display Reports  | X. Exit  |

 Please, enter a choice: s


 LIST OF STUDENTS

Id      FirstName    LastName    Birthdate    Age    Group
**      *********    ********    *********    ***    *****
1       Emma         Smith       12/04/1997   23     IT-02-A
2       Jack         Brown       08/07/1993   27     IT-02-A
3       Michael      Garcia      11/01/1999   21     IT-02-A
4       Lisa         Jones       04/29/2000   20     IT-02-A
5       John         Miller      10/27/2001   19     IT-02-A
6       Linda        Martinez    01/17/2002   18     IT-02-A
7       Richard      Davis       09/22/1997   23     IT-02-A
8       Mark         Lopez       12/09/1996   24     IT-02-A
9       Debora       Hernandez   02/25/1995   25     IT-02-A
10      Rick         Moore       03/16/2000   20     IT-02-A
11      Paul         Smith       12/23/1998   22     IT_02_B

S. Display Students  | T. Display Teachers  | A. Add Students  | R. Display Reports  | X. Exit  |

 Please, enter a choice:
```

Reports

From this point forward, developing the rest of the assignment is optional. However, do take it into account when making your list of classes and their members!

Functional design

When the user has editor access, entering the letter "R" shows the list of the reports of all the students.

A newly inserted student does not have grades therefore all the grades will be have to be set to zero, as shown below:

```
S. Display Students  | T. Display Teachers  | A. Add Students  | R. Display Reports  | X. Exit  |

 Please, enter a choice: r


 STUDENT RESULTS

Id    FirstName    LastName     Birthdate    Age    Group    Java    CSharp    Python    PHP
**    *********    ********     *********    ***    *****    ****    ******    ******    ***
1     Emma         Smith        12/04/1997   23     IT-02-A  54      50        66        54
2     Jack         Brown        08/07/1993   27     IT-02-A  72      68        43        95
3     Michael      Garcia       11/01/1999   21     IT-02-A  45      71        55        84
4     Lisa         Jones        04/29/2000   20     IT-02-A  98      64        81        72
5     John         Miller       10/27/2001   19     IT-02-A  100     94        99        93
6     Linda        Martinez     01/17/2002   18     IT-02-A  55      79        81        55
7     Richard      Davis        09/22/1997   23     IT-02-A  51      64        39        59
8     Mark         Lopez        12/09/1996   24     IT-02-A  78      98        89        99
9     Debora       Hernandez    02/25/1995   25     IT-02-A  59      55        67        99
10    Rick         Moore        03/16/2000   20     IT-02-A  96      87        55        82
11    Paul         Smith        12/23/1998   22     IT_02_B  0       0         0         0


 Enter student id (Report Details) | Or 0 back to main menu:
```

By entering the id of a student in the 'Display reports' screen, the report details of the student appears, see the following picture!

```
 Enter student id (Report Details) | Or 0 back to main menu: 11

Report of student Paul Smith

Student Id    ...............   11
First Name    ...............   Paul
Last Name     ...............   Smith
Age     ......................   22

            COURSES

Java    ......................   0
CSharp    ...................   0
Python    ...................   0
PHP     ......................   0


            RESULTS

Result    ...................   Not Passed
Retakes   ...................   4


A. Add (Update) Report  | R. Display Reports  | B. Back to Main  | X. Exit  |

 Please, enter a choice: Select a menu:
```

Enter the letter "A" to add or modify a selected report:

```
Report of student Paul Smith

Student Id    ...............   11
First Name    ...............   Paul
Last Name     ...............   Smith
Age     ......................   22

            COURSES

Java    ......................   0
CSharp    ...................   0
Python    ...................   0
PHP     ......................   0


            RESULTS

Result    ...................   Not Passed
Retakes   ...................   4


A. Add (Update) Report  | R. Display Reports  | B. Back to Main  | X. Exit  |

 Please, enter a choice: Select a menu: a
Current grade Java is: 0 Enter (new) grade: 69
Current grade CSharp is: 0 Enter (new) grade: 76
Current grade Python is: 0 Enter (new) grade: 55
Current grade PHP is: 0 Enter (new) grade: 88
Select a menu:
```

Enter the letter "R" to check the new grades!

The new grades of the student are now available on the list.

```
A. Add (Update) Report  | R. Display Reports  | B. Back to Main  | X. Exit  |

 Please, enter a choice: Select a menu: a
Current grade Java is: 0 Enter (new) grade: 69
Current grade CSharp is: 0 Enter (new) grade: 76
Current grade Python is: 0 Enter (new) grade: 55
Current grade PHP is: 0 Enter (new) grade: 88
Select a menu: r
display Report .................


 STUDENT RESULTS

Id      FirstName    LastName    Birthdate     Age    Group     Java    CSharp    Python    PHP
**      *********    ********    *********     ***    *****     ****    ******    ******    ***
1       Emma         Smith       12/04/1997    23     IT-02-A   54      50        66        54
2       Jack         Brown       08/07/1993    27     IT-02-A   72      68        43        95
3       Michael      Garcia      11/01/1999    21     IT-02-A   45      71        55        84
4       Lisa         Jones       04/29/2000    20     IT-02-A   98      64        81        72
5       John         Miller      10/27/2001    19     IT-02-A   100     94        99        93
6       Linda        Martinez    01/17/2002    18     IT-02-A   55      79        81        55
7       Richard      Davis       09/22/1997    23     IT-02-A   51      64        39        59
8       Mark         Lopez       12/09/1996    24     IT-02-A   78      98        89        99
9       Debora       Hernandez   02/25/1995    25     IT-02-A   59      55        67        99
10      Rick         Moore       03/16/2000    20     IT-02-A   96      87        55        82
11      Paul         Smith       12/23/1998    22     IT_02_B   69      76        55        88


 Enter student id (Report Details) | Or 0 back to main menu:
```

Managers (admin access level)

Managers can access all the functionalities that are available for the students and the teachers.

In addition, they are also able to:

- Remove students from the system.
- Add teachers to the system
- Remove teachers from the system