CENG 206 - Spring 2019

Project-1_v1.1

(to be implemented in C++, Due 05/05/2019)

In this project, you will implement an automatic course planner for a curriculum semester of a department. In the curriculum, there are several courses for each year of the curriculum. Your program will assign a classroom and a time slot for each course in the curriculum. Courses in the same year should not be intersected with each other (i.e., see CENG Spring curriculum). There can be some intersection between courses of different years. There are 2 different types of the classroom; big and small. Mandatory courses in the curriculum should be assigned to a big classroom. Elective courses can be assigned to a big or small classroom according to the availability of them. There is a limited number of dedicated classrooms for the department. The number of each type of classroom should be read from a file. In addition, for each weekday there are 2-time slots available; morning and afternoon. So there are in total 10 time slots available to place a course (5 weekdays*2).

In the department curriculum, there are some service courses which are given by another department at the university. The time slot of these courses is fixed and predefined. Therefore, you cannot assign different time slots for those courses other than the requested time slot. Furthermore, some instructors may not available for some time slots. Thus, your program should respect these busy time slots for the respective courses. All of these constraints should be taken from a file. You should not assume anything in prior and not use any hard-coded parameter in your code.

In the end, your program will produce a file which contains a course schedule for the department. In this schedule, there should not be any intersection between courses for a year of the curriculum and respect to all constraints. If your program cannot find any possible schedule it will print a message “There is no way to make a perfect schedule for the department.”

GUI Part: +10 pts bonus.
You will implement a GUI system which can take inputs directly from the user instead of reading them from a file. The design parameters are totally up to you. C++ does not have a library for creating a desktop application. However, using some library extensions, you can design a GUI for your C++ program. Qt is one of the most popular libraries for creating GUI for C++ programs. It also provides an IDE, Qt Creator, in which you can easily design your GUI by drag&drop fashion and easily integrate your C++ program to it.

Notes: There will be 2 checkpoints.

1. In the first checkpoint (26/04/2019), your program should read related data from the files appropriately and create necessary objects of abstract data types. A small report which contains the pseudocode of your algorithm and your class diagrams and class interactions.
2. In the second checkpoint (05/05/2019), your program should be completed. In office hours, you will present your program to me.

Implementation details:

1. Your C++ program must include the following programming features;
    a. Exception handling; for file operations and any other necessary cases you should adopt exception handling mechanism properly.
    b. Default parameter; One of your function in the program should support function with default arrangements.
    c. Operator overloading; you should use at least one operator overloaded function. For example, you can use it for checking some values of two objects of the same class by overloading == operator. However, you are free to implement which operator you want.
    d. Inline function; Implement one of your function by using inline function.
    e. Constructor/destructor; For each class you implemented should include a constructor and destructor.

f. Vectors; you are suggested to use “vector” data structure for array implementations in your code. Try to efficiently use vectors by using c++ functions, such as ‘sort’ if you need to sort the elements in the vector.

2. You should implement your program with proper usage of headers and source codes. You may have the following files for the project:
    a. course.hpp
    b. electiveCourse.hpp
    c. compulsoryCourse.hpp
    d. classroom.hpp
    e. bigClassroom.hpp
    f. smallClassroom.hpp
    g. scheduler.hpp
    h. scheduler.cpp
    i. main.cpp
3. Format of the files;
    a. Courses.csv contains all courses in the curriculum. Each line has 7 items separated by ‘;’, from left to right; code of the course, name of the course, the year of the semester, credit, C: compulsory or E: Elective, D: department or S: service, name of the instructor.
    CENG104;COMPUTER PROGRAMMING II;1;6;C;D;OGR.GOR. YUSUF EVREN AYKAC
    CHEM101;GENERAL CHEMISTRY;1;5;C;S;DOC.DR. NURAY CELEBI
    CENG316;PARALLEL PROGRAMMING;3;5;E;D;DR. OGR. UYESI FAHREDDIN SUKRU TORUN
    …
    b. Service.csv contains time slot of service courses. Format of it as follows:
    CHEM101;Tuesday;Morning
    MATH102;Monday;Afternoon
    …
    c. Busy.csv contains the busy time slots for the respective course. You cannot assign a course to the specified time slot. That is, for example, CENG104 should not be placed on Tuesday according to the below file.
    CENG104;Tuesday;Morning
    CENG104;Tuesday;Afternoon
    CENG316;Friday;Afternoon
    CENG206;Monday;Morning
    d. Classroom.csv contains the number of classrooms for each type. For example, the following file means that there are 2 big classrooms and 1 small classroom.
        bigClass;2
        smallClass;1
4. Your output should be ordered by weekdays and then classroom Id. The sample output file:
    Monday Morning bigClass1 CENG104
    Monday Morning bigClass2 CENG202
    Monday Morning smallClass1 CENG310
    Monday Afternoon bigClass1 MATH102
    Monday Afternoon bigClass2 ENGR202
    Monday Afternoon smallClass1 CENG415
    Tuesday Morning bigClass1 CHEM101
    Tuesday Morning bigClass2 --------
    Tuesday Morning smallClass1 CENG317
    Tuesday Afternoon bigClass1 ENG254
    Tuesday Afternoon bigClass2 CENG204
    Tuesday Afternoon smallClass1 --------
    Wednesday Morning bigClass1 TIT101
    Wednesday Morning bigClass2 --------
    …