

Question

There are two types of courses offered at the Faculty of Computing of Universiti Teknologi Malaysia, lectured and non-lectured. A lectured course is a regular course which has a lecturer teaching the class; whereas a non-lectured course does not require a lecturer, for example final year undergraduate projects, and internship courses. Besides that, a non-lectured course has a prerequisite minimum credit hour, indicating that the student needs to earn at least the minimum credit hour before he or she can enrol for the course. Each course, regardless lectured or non-lectured, is assigned with a code and name.

- (a) Draw the UML class diagram for the above problem. Your design should include the classes and their attributes and methods as specified in Table B1; as well as relationships between the classes. Then, write the C++ code to implement the design. Your implementation should apply the concept of data hiding in which all the attributes are inaccessible from outside of the class. (7 marks)
- (b) Finally, use the classes to create a program that helps the faculty to manage two types of courses, subject-based and project-based courses. You need to create two arrays named `subjects` which is of type `LecturedCourse` and `projects` of type `NonLecturedCourse`, respectively. Also, the program should provide the user a menu-driven interaction with the options as described in Table B2. The program repeats until the user chooses to exit. Refer to Figure B1 for the example run of the program. (23 marks)

Table B2: The menu of the program

Menu Options	Description
1. Add subject	To insert a new subject course into the array <code>subjects</code> .
2. Add project	To insert a new project course into the array <code>projects</code> .
3. Print subjects	To print the subject's name and the lecturer for all the subject courses.
4. Print projects	To print the subject's name and the minimum credit hours for all the project courses.
5. Exit	To end the program.

Table B1: The classes

Class	Attribute	Method
Course	The course's code and name.	<ul style="list-style-type: none">• The method <code>getName</code> that accesses the course's name.
LecturedCourse	The lecturer as well as the course's code and name.	<ul style="list-style-type: none">• The method <code>getLecturer</code> that accesses the course's lecturer.• The method <code>setLecturer</code> that sets the lecturer for the course.• The method <code>read</code> that reads in input from the keyboard for the attributes.
NonLecturedCourse	The minimum credit hours as well as the course's code and name.	<ul style="list-style-type: none">• The method <code>getMinCredit</code> that accesses the course's pre-requisite minimum credit hour.• The method <code>read</code> that reads in input from the keyboard for the attributes.
Lecturer	The lecturer's name.	<ul style="list-style-type: none">• The method <code>getName</code> that accesses the lecturer's name.• The method <code>setName</code> that sets the lecturer's name.

----- Menu-----

1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 1

Adding a new subject course:

Code => **SCSJ1013**

Name => **Programming Technique I**

Lecturer => **Dr Muhammad Razali**

----- Menu-----

1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 1

Adding a new subject course:

Code => **SCSJ1023**

Name => **Programming Technique II**

Lecturer => **Mr Abdul Hakim Abdullah**

----- Menu-----

1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 2

Adding a new project course:

Code => **SCSV3032**

Name => **Graphics and Multimedia Software Project I**

Min Credit => **80**

----- Menu-----

1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 2

Adding a new project course:

Code => **SCSJ3032**

Name => **Software Engineering Project I**

Min Credit => 80

----- Menu-----

1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 2

Adding a new project course:

Code => **SCSV4044**

Name => **Graphics and Multimedia Software Project II**

Min Credit => 90

----- Menu-----

1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 3

The list of subject courses:

Course Name	Lecturer
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Programming Technique I	Dr Muhammad Razali
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Programming Technique II	Mr Abdul Hakim Abdullah
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----- Menu-----

1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 4

The list of project courses:

```
Course Name                               Min Credit Hour
Graphics and Multimedia Software Project I      80
Software Engineering Project I                  80
Graphics and Multimedia Software Project II     90

----- Menu-----
1. Add subject
2. Add project
3. Print subjects
4. Print projects
5. Exit

Enter your choice => 5

Program ends!
```

Figure B1: An example run of the program. Note that, the bold texts indicate input entered by the user.