Advanced Procedural Programming Laboratory

Lab Exam

16th March 2022

Duration: 1Hour 45Mins

Lab Exam Conditions

- Comments expected.
- Good programming practice is expected
- Source Code to be submitted to Moddle by the end of the lab exam.
- Plagiarism is not acceptable.
- You are permitted access to all the course materials during the lab exam, but no other sources should be used during the lab exam. I would ask you to self-police this rule during the exam.
- You may be asked to present your code/application.

Problem Statement

Company XYZ keeps a record of all student record for the Institute for a given year.

Write a program to maintain a database of winning student details, with the size of the database being set by the program user.

The student details structure contains the following members:

- Student Type (Could be stored as an Integer or a Character Array)
    - Note the student type can only be three options on-campus, hybrid, online.
- Home County (Character Array)
- Student ID (Integer)
- Student First Name (Character Array)
- Student Surname (Character Array)
- Average Grade (Float)

The program should first initialise the array of winning student structures by placing a "-1" in the Student ID of each array element.

The program should include the following menu, which allows the user to manipulate the database of winning race times:

1. **Add a new student to the array as long as there is space available in the array.**

A function should be written to support this feature. The function should receive a pointer to the first element in the winning race time's array and the size of the array and the student ID.

Important:

- The user must enter a value of greater than 0 for the student ID.
- Only Unique Student IDs can be added to the database.
- The function should only add one entry into the array.

2. **Display the Student Details of the student with the best average in the student database.**

This function should search in the database for the Student with the Best Average and display their details. The function should receive a pointer to the first element in the winning race time's array and the size of the array

3. **Retrieve the name of student(s) that are below a threshold which is set by the user. A function should be written to support this feature.**

The function should receive a pointer to the first element in the stock item array and the size of the array

4. **Determine the Percentage of Students from a county which is set by the user.**

A function should be written to support this feature. The function should receive a pointer to the first element in the stock item array and the size of the array

5. **Exit on "-1"**

At the end of the program the contents of the database should be outputted to Student.txt. Student.txt should have the following format:

Online Galway 123 Martin Hynes 45.7

On Campus Galway 124 Tom Flynn 45.7

Online Dublin 125 Owen Smith 45.7

Source Code to be submitted to Moddle by the end of the lab exam.

Example Program Output

```
Please enter the size of the student database
3

Please enter 1 to add a new student
Please enter 2 to display the student with the best average
Please enter 3 to display the students below a threshold grade
Please enter 4 to display the proportion of students from a given county
Please enter -1 to exit
1

Please enter the student ID
1
Please enter the student first name
Martin
Please enter the student surname
Hynes
Please enter the student home county
Galway
Please enter the student grade
41
Please select your mode of study - 1 On Campus 2 Hybrid 3 Online
1

Please enter 1 to add a new student
Please enter 2 to display the student with the best average
Please enter 3 to display the students below a threshold grade
Please enter 4 to display the proportion of students from a given county
Please enter -1 to exit
1

Please enter the student ID
1
The student ID already exists

Please enter 1 to add a new student
Please enter 2 to display the student with the best average
Please enter 3 to display the students below a threshold grade
Please enter 4 to display the proportion of students from a given county
Please enter -1 to exit
1

Please enter the student ID
2
Please enter the student first name
Mary
Please enter the student surname
Smith
Please enter the student home county
Galway
Please enter the student grade
90
Please select your mode of study - 1 On Campus 2 Hybrid 3 Online
```

2

Please enter 1 to add a new student
Please enter 2 to display the student with the best average
Please enter 3 to display the students below a threshold grade
Please enter 4 to display the proportion of students from a given county
Please enter -1 to exit
1

Please enter the student ID
3
Please enter the student first name
Liam
Please enter the student surname
Brady
Please enter the student home county
Dublin
Please enter the student grade
45
Please select your mode of study - 1 On Campus 2 Hybrid 3 Online
3

Please enter 1 to add a new student
Please enter 2 to display the student with the best average
Please enter 3 to display the students below a threshold grade
Please enter 4 to display the proportion of students from a given county
Please enter -1 to exit
2

Student ID 2 Name Mary Smith
Student Grade 90.000000, Student County Galway
Student Mode Hybrid

Please enter 1 to add a new student
Please enter 2 to display the student with the best average
Please enter 3 to display the students below a threshold grade
Please enter 4 to display the proportion of students from a given county
Please enter -1 to exit
3
Please enter the threshold below you wish to display students
50

Student ID 1 Name Martin Hynes
Student Grade 41.000000, Student County Galway
Student Mode On Campus
Student ID 3 Name Liam Brady
Student Grade 45.000000, Student County Dublin
Student Mode Online
Please enter 1 to add a new student
Please enter 2 to display the student with the best average
Please enter 3 to display the students below a threshold grade
Please enter 4 to display the proportion of students from a given county
Please enter -1 to exit
4

Please enter the county you want the proportion for

Galway

The percentage of student from Galway is 0.666667

Please enter 1 to add a new student

Please enter 2 to display the student with the best average

Please enter 3 to display the students below a threshold grade

Please enter 4 to display the proportion of students from a given county

Please enter -1 to exit

-1

Outputted the database to file