ECE 175 Computer Programming for Engineering Applications

Homework Assignment 7

Due Date: Tuesday April 3, 2018, 11:59 PM, via D2L Drop-box

Conventions: Name your *C* programs *hw***x***p***y**.*c* where *x* corresponds to the homework number, and *y* corresponds to the problem number. For example, the *C* program for homework 7, problem 1 should be named as *hw***5***p***1**.*c*.

Submission Instructions: Use **Zylab** and the **"Assignments"** drop-box on D2L to submit your homework. Submit

Problem 1: Calculate your grade (50 points)
Write a *C* program to calculate student grades in this class. Your code must use a structure named *student_info*. The structure must have the following fields (at least).

- **Student_Name** : A character array for the student's name; 100 elements is fine.
- **Zyante_Assignments** : An integer array of 3 Zybooks entries (only 3 to reduce the number of inputs).
- **Homework_Assignments** : An integer array of 5 homework entries (only 5 to reduce the number of inputs).
- **In_Class_Participation**: An integer, number of points earned for inclass participation.
- **Midterm1** : An integer, points earned on exam 1.
- **Midterm2** : An integer, points earned on exam 2.
- **Final_Project** : An integer containing the points earned on the project.
- **Grade_Prcnt** : A float showing the percentage calculated.
- **Letter_Grade** : A char showing the letter grade.

Your *C* program must

1. Prompt the user to enter in the number of students in the class.
2. Dynamically allocate memory for the appropriate number of students.
3. Ask the user to enter information for each student:
   - Student's Name
   - Student's scores for each Zyante participation, homework assignment, in-class participation, midterm, and final project.
4. Calculate grade percent, and letter grade.
5. Ask the user which student's information should be displayed.
6. Display the information for that particular student.
7. Repeat steps 5 and 6 until the user decides to quite.
8. Free any memory that was dynamically allocated

For this homework you do not need to use linked lists. Using an array of type *student_info* is perfectly acceptable. However, your program must make use of the following functions

- `void Print_Student(student_info X);`
- `void Scan_Student_Info(student_info *S);`

To calculate the letter grade use the tables from the syllabus

Grading Scheme

Grade Weights

Zyante Assignments :	10%
Homework Assignments:	30%
In-class Participation:	5%
Midterm 1:	15%
Midterm 2:	15%
Final Project	25%
Total	100%

Letter Grade Assignment

90% - 100%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
<60%	E

Sample Code Execution: **Red text indicates information entered by the user**

```
Enter the number of students in the class: 4

Enter in the name of student number 1: Adam
Enter 3 Zybooks scores(out of 10) :9 9 10
Enter 5 homework scores(out of 100) :90 100 80 80 90
Enter the in-class participation score (out of 100) :100
Enter midterm 1 (out of 100) :90
Enter midterm 2 (out of 100) :90
Enter final project(out of 100) :80

Enter in the name of student number 2: Sally
Enter 3 Zybooks scores(out of 10) :9 8 8
Enter 5 homework scores(out of 100) :90 90 80 90 90
Enter the in-class participation score (out of 100) :100
Enter midterm 1 (out of 100) :90
Enter midterm 2 (out of 100) :80
Enter final project(out of 100) :80

Enter in the name of student number 3: Sam
Enter 3 Zybooks scores(out of 10) :9 10 10
Enter 5 homework scores(out of 100) :100 80 70 90 95
Enter the in-class participation score (out of 100) :100
Enter midterm 1 (out of 100) :90
Enter midterm 2 (out of 100) :80
Enter final project(out of 100) :80

Enter in the name of student number 4: Alex
Enter 3 Zybooks scores(out of 10) :8 8 9
Enter 5 homework scores(out of 100) :50 70 80 60 70
Enter the in-class participation score (out of 100) :90
Enter midterm 1 (out of 100) :90
Enter midterm 2 (out of 100) :90
Enter final project(out of 100) :80

Which student's info would you like to display? (1-4) 4

Grade information for Alex
Zybooks Scores = [8, 8, 9]
Homework Scores = [50, 70, 80, 60, 70]
In-class Participation Score = 90
Midterm Scores = [90, 90]
Final Project Score = 80
Calculated Percentage = 79.63
The Final Grade for Alex is C

Would you like to print out the information of another student (y/n)? y

Grade information for Sally
Zybooks Scores = [9, 8, 8]
Homework Scores = [90, 90, 80, 90, 90]
In-class Participation Score = 100
Midterm Scores = [90, 80]
Final Project Score = 80
Calculated Percentage = 85.23
The Final Grade for Sally is B

Would you like to print out the information of another student (y/n)? n
Goodbye
```

Problem 2: Read Class Data from a File and Sort (50 points)
The file *ClassData10.txt* contains grade information for 10 *fictitious* students. The file format is

- Student Name
- 12 Reading Assignment Scores
- 8 Homework Scores
- Scores for in-class participation, midterm 1, midterm 2, and the final project

Using an array of type *student_info*, write a *C* program that

1. Reads the file information into a 10 element array of type *student_info*. Make sure you update the structure *student_info* from problem 1 to accept 12 reading assignments and 8 homework scores.
2. Calculates the final grades for all 10 students.
3. Print the final scores in order, from highest to lowest.

The following functions will sort an array of type *int*. Modify these functions to use variables of type *student_info*.

Your program must make use of the following functions

- `void Print_Student(student_info X);`
- `void Scan_Student_Info(student_info *S, FILE *fp);`

```c
void selection(int x[], int size) { // selection sort
  int i, j;
  int max;

  for (i = 0; i < size; i++) {
    max = i; // start searching from currently unsorted
    for (j = i; j<size; j++) {
      if (x[j] > x[max]) // if found a larger element
        max = j; // move it to the front
    }
    swap(&x[i], &x[max]);
  }
}

void swap(int *x, int *y) {
  int temp;
  temp = *x;
  *x = *y;
  *y = temp;
}
```

Sample Code Execution: **Red text indicates information entered by the user**

```
Grade information for Sarah
Zybooks Scores = [9, 2, 5, 6, 3, 8, 9, 8, 3, 10, 10, 1]
Homework Scores = [93, 95, 95, 92, 94, 96, 92, 94]
In-class Participation Score = 94
Midterm Scores = [95, 98]
Final Project Score = 93
Calculated Percentage = 91.23
The Final Grade for Sarah is A

Grade information for Lily
Zybooks Scores = [10, 1, 10, 7, 6, 8, 0, 10, 5, 4, 7, 4]
Homework Scores = [87, 85, 100, 89, 81, 88, 83, 84]
In-class Participation Score = 95
Midterm Scores = [99, 90]
Final Project Score = 98
Calculated Percentage = 89.74
The Final Grade for Lily is B

Grade information for David
Zybooks Scores = [9, 4, 10, 5, 6, 10, 8, 1, 2, 2, 9, 4]
Homework Scores = [82, 78, 96, 93, 84, 86, 85, 100]
In-class Participation Score = 90
Midterm Scores = [94, 91]
Final Project Score = 98
Calculated Percentage = 88.98
The Final Grade for David is B
```

```
Grade information for Sydney
Zybooks Scores = [9, 2, 4, 10, 2, 5, 8, 7, 3, 6, 10, 3]
Homework Scores = [72, 82, 100, 82, 80, 88, 95, 33]
In-class Participation Score = 95
Midterm Scores = [96, 93]
Final Project Score = 99
Calculated Percentage = 87.30
The Final Grade for Sydney is B

Grade information for Jennifer
Zybooks Scores = [6, 4, 9, 4, 9, 10, 9, 7, 3, 3, 4, 10]
Homework Scores = [85, 33, 94, 90, 85, 84, 87, 92]
In-class Participation Score = 100
Midterm Scores = [94, 88]
Final Project Score = 94
Calculated Percentage = 86.68
The Final Grade for Jennifer is B

Grade information for Scott
Zybooks Scores = [8, 9, 10, 5, 0, 4, 0, 10, 5, 6, 1, 9]
Homework Scores = [81, 82, 39, 90, 88, 88, 91, 45]
In-class Participation Score = 100
Midterm Scores = [100, 94]
Final Project Score = 96
Calculated Percentage = 86.33
The Final Grade for Scott is B

Grade information for Natalie
Zybooks Scores = [4, 10, 7, 6, 1, 3, 10, 9, 2, 9, 10, 4]
Homework Scores = [93, 97, 30, 94, 38, 94, 93, 91]
In-class Participation Score = 90
Midterm Scores = [93, 99]
Final Project Score = 90
Calculated Percentage = 85.68
The Final Grade for Natalie is B

Grade information for Joshua
Zybooks Scores = [4, 0, 9, 9, 1, 3, 3, 7, 6, 2, 1, 0]
Homework Scores = [94, 85, 84, 89, 82, 95, 90, 94]
In-class Participation Score = 50
Midterm Scores = [97, 91]
Final Project Score = 97
Calculated Percentage = 85.44
The Final Grade for Joshua is B

Grade information for Emily
Zybooks Scores = [1, 4, 4, 5, 10, 9, 8, 9, 4, 2, 1, 10]
Homework Scores = [100, 85, 65, 98, 99, 32, 72, 81]
In-class Participation Score = 100
Midterm Scores = [98, 97]
Final Project Score = 85
Calculated Percentage = 84.78
The Final Grade for Emily is B

Grade information for Megan
Zybooks Scores = [5, 4, 8, 0, 9, 0, 0, 7, 2, 4, 10, 7]
Homework Scores = [88, 81, 64, 84, 91, 85, 92, 90]
In-class Participation Score = 100
Midterm Scores = [91, 96]
Final Project Score = 85
Calculated Percentage = 84.28
The Final Grade for Megan is B
Goodbye
```