

DEPARTMENT OF COMPUTER ENGINEERING
CMPE110: Fundamentals of Computing and Programming
EXPERIMENT 4

Introduction to C++ Programming: repetitive structure

Objectives:

- 1) Understand how to edit, compile and execute C++ computer codes.
- 2) Understand C++ programming: repetitive structure.

Note: Before writing a computer code, you should do the following steps: 1) **understand** and **analyze** the problem, 2) develop an **algorithm** or **flowchart** and 3) convert the **algorithm** or the **flowchart** into a C **code**.

- 1) Consider the following code that finds the sum of all integers between 1 and the number N:

```
#include<iostream>
#include<cmath>
using namespace std;
int main(){
int N,i, sum=0;
cout << "Enter an integer number: ";
cin>> N;
for(i=1;i<=N;++i)
    sum=sum+i;
cout<< "The sum="<< sum << endl;
system("pause");
return 0;}
```

- a) Edit, compile and execute this code. Use the following input values for N: **10**.
- b) Modify the given code to read the value of N and find and prints the sum of the even numbers only. **Note:** a number i said to be even if it can be divided by 2 without a remainder, i.e., $i\%2=0$

A sample run of the program must be as follows:

```
*** Program to claculate find the sum of even numbers between 1 and a numbers N ***
Enter an integer number N: 10
The sum of even numbers is 30.
```

- c) How can you modify part b to find the average of the even numbers only?

- 2) Write a program to calculate the sum of: $1^2 + 2^2 + 3^2 + \dots + N^2$.

A sample run of the program must be as follows:

```
Enter an integer number N: 5
The sum is 55.
```

3) Write a C program that will read the birth year of 4 students and finds 1) the average age; 2) the maximum age and 3) the minimum age.

Note: Age = Current Year - Birth Year

Exercise:

4) The GPA of a student taking 5 courses is calculated as

$$\text{GPA} = \frac{\sum_{i=1}^5 p_i * cr_i}{\sum_{i=1}^5 cr_i}$$

where cr_i and p_i are, respectively, the credit and the points of the i^{th} course. The points indicate how well a student has done in a particular course and vary depending on the letter grade received from that course. More formally, the points are calculated according to the following table:

Letter grade	Points
A	4
B	3
C	2
D	1
F	0

You are asked to write one C code to calculate the GPA of 30 students in the class. Assume that all students are taking 5 courses and the letter grade is calculated according the student's course average as

```

80 ≤ average ≤ 100 letter grade = A
70 ≤ average < 80 letter grade = B
60 ≤ average < 70 letter grade = C
50 ≤ average < 60 letter grade = D
Otherwise letter grade = F

```

where the average is computed as:
 $\text{average} = 0.5 * \text{final} + 0.4 * \text{midterm} + 0.1 * \text{lab}$.

You are asked to write one C code to do the following:

- 1) For each student calculate the GPA.
- 2) Find the highest GPA, and the lowest GPA.

Note: The lab, the midterm and the final grades for each student course can be entered as inputs from the keyboard.