

# COP3014-Foundations of Computer Science

## Assignment #5

100 points

**ALWAYS COMPLETE AND SUBMIT YOUR PROGRAM  
EVEN IF IT IS LATE!**

### Objectives:

1. Read the contents of a datafile one record at a time;
2. Process the data that was read from the datafile one record at a time;
3. Print a record to a datafile using an ofstream object;
4. Be able to use the fstream library;
5. Be able to use records (class with only data);
6. Be able to use an ifstream object;
7. Be able to use an ofstream object;

This assignment is an extension of Assignment#2. You will implement a program called *"call\_stats3.cpp"* to process customer call records. Each customer call record contains seven fields, which are as follows: 1) a ten digit cell phone number (string, no dashes), 2) the number of relay stations used in making the call (integer), 3) the length of the call in minutes (integer), 4) the net cost of the call (double), 5) the tax rate (double), 6) the call tax (double) and 7) the total cost of the call (double). Your program will have 3 functions: Input, Process and Output. Your main program will call each function until the end of the datafile has been read. Each call record will be printed to a data file. Following are the descriptions of the functionality of each function:

1. The void function *"Input"* will have two parameters: an input file stream called *"in"*, and a customer call record called *"call\_records"*. The function will read the cell\_number, relays, and call\_length, in minutes, into the a call record from the data file.
2. The function *"Process"* will calculate the net cost of a call (*net\_cost*), the tax on a call (*call\_tax*) and the total cost of the call (*total\_cost*) using *the number of relay stations (relays)* and *the length in minutes of the call (call\_length)* for a call record. Please consider the following:
  - a. The *tax rate on a call (call\_tax)* is simply based on the number of *relay stations (relays)* used to make the call ( $0 \leq \text{relays} \leq 5$  then

*call\_tax* = 1%; 6<=*relays* <=11 then *call\_tax* = 3%; 12<=*relays*<=20 then *call\_tax* = 5%; 21<=*relays* <=50 then *call\_tax* = 8%; *relays* >50 then *call\_tax* =12%) .

- b. The *net cost of a call* is calculated by the following formula: *net\_cost* = ( *relays* / 50 x 0.40 x *call\_length*).
  - c. *The tax on a call is equal to net\_cost x call\_tax / 100.*
  - d. *The total cost of a call (rounded to the nearest hundredth)* is calculated by the following formula: *total\_cost* = *net\_cost* + *call\_tax* . All tax and cost calculations should be rounded to the nearest hundredths.
3. The function "***Output***" will print every field of a call record to the file "***weekly\_call\_info.txt***". The fields should be printed in the following order: 1) cell phone number, 2) number of relay stations, 3) length of the call in minutes, 4) net cost, 5) tax rate, 6) call tax, 7) total cost of call. [See the sections below called "Input Stream" and "Format of Output" for more information.](#) See the section "***Format of the input data file(input filename is "call\_data.txt")***".

You may implement more functions if you find it necessary. Please start the assignment ASAP and ask questions to make sure you understand what you must do. Remember to follow all style rules and to include all necessary documentation (consistent, indentation, proper variable names, pre/post condition, program header, function headers, and so forth.)

Finally, your input data file (*call\_data.txt*) should be in the same directory as your program source file (*call\_Stats3.cpp*).

### **Output Format for the Function "*Output*":**

Consider the following sample output table when designing and implementing the function "***Output***". See section "***Format of Output (output filename is "weekly\_call\_info.txt")***" below:

(The output is in the following order: cell phone number, relays, minutes, net cost, tax rate, call tax, total call cost)

9546321555	0	0	0.00	0.01	0.00	0.00
9546321555	15	30	3.60	0.05	0.18	3.78
9546321555	4	3	0.10	0.01	0.00	0.10

## Input Stream:

In the assignment you will declare one **ifstream** to bind your input to the file *"call\_data.txt"* and one **ofstream** to bind your output to the file *"weekly\_call\_info.txt"*. Whenever a program performs *file i/o* you must include the **"fstream"** library. Add the following statements to your program:

For source file, *"call\_stats3.cpp"*:

- Add **"#include <fstream>"** to your # include statements in your source file.
- Add **"include <string>"** to your # include statements in your source file.

**Format of the input data file(input filename is "call\_data.txt"):** **Do not include column titles**

(The order of the columns are as follows: cell phone number, relays, minutes)

9546321555	0	0
5612971340	5	50
3051234567	8	25
7542346622	24	17
3054432762	15	30
9544321011	50	100
8776219988	87	82
9042224556	4	5
7877176590	11	1
5617278899	20	45
9546321555	4	3
5612971340	79	86
3051234567	8	25
7542346622	24	118
3054432762	115	25
9544321011	43	10
8776219988	265	22
9042224556	2	5
7877176590	89	67
5617278899	40	56

### Format of Output (output filename is "weekly\_call\_info.txt"):

(the order of the columns is as follows: cell phone number, relays, minutes, net cost, tax rate, call tax, total call cost)

9546321555	0	0	0.00	0.01	0.00	0.00
5612971340	5	50	2.00	0.01	0.02	2.02
3051234567	8	25	1.60	0.03	0.05	1.65
7542346622	24	17	3.26	0.08	0.26	3.53
3054432762	15	30	3.60	0.05	0.18	3.78
9544321011	50	100	40.00	0.08	3.20	43.20
8776219988	87	82	57.07	0.12	6.85	63.92
9042224556	4	5	0.16	0.01	0.00	0.16
7877176590	11	1	0.09	0.03	0.00	0.09
5617278899	20	45	7.20	0.05	0.36	7.56
9546321555	4	3	0.10	0.01	0.00	0.10
5612971340	79	86	54.35	0.12	6.52	60.87
3051234567	8	25	1.60	0.03	0.05	1.65
7542346622	24	118	22.66	0.08	1.81	24.47
3054432762	115	25	23.00	0.12	2.76	25.76
9544321011	43	10	3.44	0.08	0.28	3.72
8776219988	265	22	46.64	0.12	5.60	52.24
9042224556	2	5	0.08	0.01	0.00	0.08
7877176590	89	67	47.70	0.12	5.72	53.43
5617278899	40	56	17.92	0.08	1.43	19.35

### Handing in your program

Electronically submit *the source file "call\_stats3.cpp"* in the Assignments area of blackboard before the due date and time. **Remember, submit your programs on time no matter if they are incorrect and/or complete!**