Lab 16: Nested loops **Due:** 11/6/24

In this lab you will practice using nested loops. There are different combinations of nested loops (see my class examples) that you may need to used depending on the structure of the data that you need to process. The example below shows how to nest an end-of-file loop with a counter-controlled loop to process data from a file.

Example Program

The example program reads the **grades.txt** file. Each line of this file contains the name of the student and that student's three exam grades. The program calculates the average of the exam grades for each student, then calculates the average of all student's average exam grades. The **classAve.cpp** program provided illustrates the skills you are learning in this lab. Open it in your IDE, read and understand the code and finally run the program to see how it works. The output for this program, using the given input file, should look like the data in the **aveGrades.txt** file.

Your Program

Your program will calculate the occupancy rate for a hotel (the percent of rooms that are occupied). You are given the file **occupants.txt** which details which rooms in the hotel are occupied. Each row of the file represents a floor in the hotel. You do not know ahead of time how many floors there are in the hotel (in other words, your program must work with an input file of this format that has an arbitrary number of rows). Each room is represented by a single digit. If the value of the digit is 1 the room is occupied, the digit is 0 if the room is not occupied. Because each floor can have a different number of rooms, the value -1 is used to indicate that the end of data for that floor has been reached.

To keep your main() function simple:

You **must** define function **printHotelOccupancy()** to calculate and display the occupancy rate for a hotel. This function receives the input file and prints the hotel occupancy table. The table must show for each floor in the hotel the number of rooms occupied and the occupancy rate for each floor as a percentage (a real number displayed with a single decimal digit). Below this information the function must show the overall occupancy rate (total number of occupied rooms/total number of rooms) as shown in the example below.

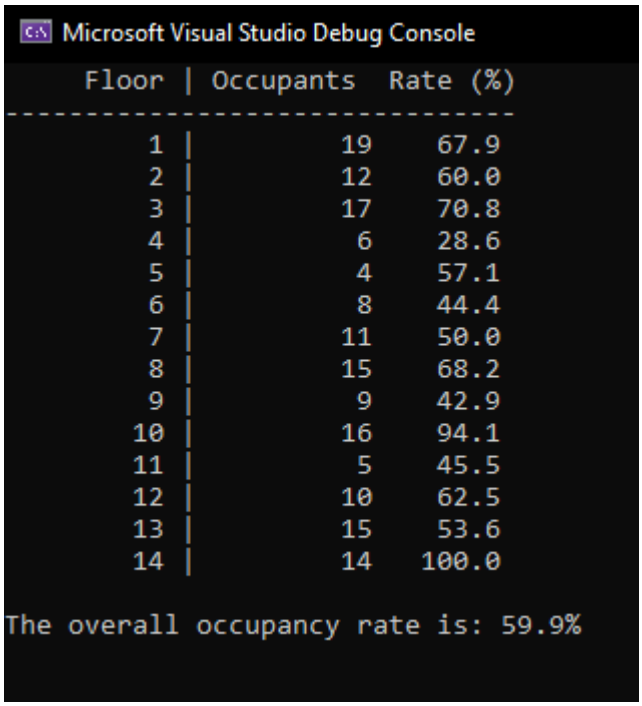
Function **main()** just need to open the input file (ensure it exists), call the function to print the table, and close the file.

Implement the algorithm provided as comments in **lab16.cpp** to create your program. Open it in your IDE and complete the program.

Note:

- Run my sample solution to know how your program must behave. Pay attention to the input and the output formats. Your solution must behave exactly like mine.

- Carefully analyze the following figure and use it as a reference to ensure you do the right things.
- Test and compare your solution with mine.
- You must define the most appropriate type of function, the parameter list (using the most appropriate parameters), and the body of the function to be implemented.
- You must use the most appropriate type of loops to solve the problem.



Don't forget to include at the top of the program the comments shown below with your information (name, class and section number, etc.)

```
////////////////////////////////////////////////////////////////////
//
// Name: <Put your name here>
// Date: <Today's date>
// Class: <Your class number and section number, like: CSCI 1470.02>
// Semester: <This semester, like: Fall 2012>
// CSCI 1470 Instructor: <Your lecture instructor's name>
//
// Program Description: Enter here your description of what the program does
//
////////////////////////////////////////////////////////////////////
```

When done, submit your solution through Blackboard using the "Assignments" tool. Do Not email it.

Paste the link to your final solution along with your source code in the textbox opened when you click on Create Submission before you click on Submit.

The following is the basic criteria to be used to grade your submission:

You start with 100 points and then lose points as you don't do something that is required.

-5: Minor mistakes
Don't print table of floors and number of occupants and corresponding occupancy rate
Don't print occupancy rates as percentage with exactly one decimal digit
-10: Moderate mistakes
Incorrect type (void/value-returning) of function
Incorrect type (value/reference) or number of parameters of the function
Incorrect function call
Doesn't properly count number of occupied rooms on each floor
Doesn't properly count total number of rooms on each floor
Doesn't properly calculate the occupancy rate for each floor
Doesn't properly count total number of rooms
Doesn't properly count total number of occupied rooms
Doesn't properly calculate overall occupancy rate
-20: Major mistakes
Incorrect type of loop (counter/eof/flag/sentinel-controlled) (each)
Doesn't properly process all floors
Doesn’t pass all tests
program does not implement the provided algorithm
Incorrect/missing source code
Incorrect/missing link to your solution
-40: Missing implementation of function **printHotelOccupancy()**
-40: Program doesn't run correctly
-50: Doesn’t use nested loops to solve the problem
-50: Program doesn't compile
-100: The code submitted is not your creation (you got it from a web site or another person)
-10: Late

Note: more points may be lost for reasons not specified here.