**SEN-102 Introduction to Programming**
**Assessment Activity SEN-102:00050 & SEN-102:00060**
**Using Text Files and Binary Files**
*Last update: 25 September 2023*

## Assignment Instructions

For this assessment activity, you will write two programs. The first, called ***taxiStats.c***, will read a text file where each line holds information about a taxi, including its registration number, color, and the total distance it has traveled in the past 30 days. Five colors are recognized: *Yellow, Green, Pink, Orange and Blue*. Any other color is invalid. The ***taxiStats.c*** program will determine and print the registration number and color of the taxis that traveled the shortest and longest distances.

In addition, it will also accumulate summary data about each color of taxi: how many taxis of that color appeared in the file, the average distance traveled by these taxis, the minimum distance traveled by any taxi of this color, and the maximum distance traveled by any taxi of this color.

When you have read all the input data, your program should then write a file holding the summary data by color. This should be a ***binary file***, not a text file. (If you write a text file for the output, you will get a zero for assessment SEN-102:00060, which measures your ability to use binary files.)

The second program should be called ***taxiReport.c***. It should read a binary file created by ***taxiStats.c*** and print a report of the data in that file.

You do not need to submit flowcharts for this assignment. Submit only the C source code for ***taxiStats.c*** and ***taxiReport.c***. Your source code must be plain text files**.** Do not submit code as a doc file, pdf file, IDE project, or anything else. I must be able to compile and run your code on my computer.

## Detailed Problem Description

The input for ***taxiStats.c*** is a text file where each line has the following format:

```
[Registration] [Color] [Distance]
```

Here is an example:

```
FW12 Pink 1207
C712 Green 812
X333 Purple 780
Z200 Green 2310
HD23 Pink 431
PP88 Blue 610
ZV51 Green 456
V987 White 890
D310 Blue 3102
LM44 Pink 55
N503 Yellow 72
T676 Green 231
K434 Pink 731
K600 Pink 1435
```

You can find several test input files on Canvas. Note that the program must be able to handle ***any*** input file that has this format. There is ***no limit*** to the number of taxis that can be included in a file.

In general, you do not need to validate the data you read from the file. However, you do need to check that the color is one of the five allowed colors (*Yellow, Green, Pink, Orange, Blue).* If the color does not match one of these, you should skip that line and continue.

Some important notes:

- Your programs must check that the input files can be opened and read successfully. If the user enters the name of a file that does not exist, the program give an error message and exit.
- It is possible that an input file may not include any taxis. In this case, your program should not create a report file.
- It is possible that an input file may include taxis for some colors, but not others.
- You should cross-check the results display by ***taxiReport*** with the input file to make sure the values reported are correct.

You will find some sample program runs on the following pages. The data files match the data files on Canvas. You should examine those sample files and compare to the program output.

### Sample Run #1 – Input file *taxiInfo1.txt*

```
./taxiStats
Name of input file with raw taxi data (text file)? taxiInfo1.txt
Name of output file for summary data (binary file)? taxi1.dat
Read 25 taxis in total
Taxi that went the smallest distance: S233 (color Pink, distance 36 km)
Taxi that went the largest distance: P877 (color Green, distance 5012 km)
Summary information successfully written to taxi1.dat

./taxiReport
Name of input file with summary data (binary file created by taxiStats)? taxi1.dat
Summary of taxi data
Taxi color Pink
        7 taxis, average distance traveled 677.29
        Minimum distance traveled: 36 km
        Maximum distance traveled: 1435 km

Taxi color Yellow
        5 taxis, average distance traveled 501.80
        Minimum distance traveled: 72 km
        Maximum distance traveled: 890 km

Taxi color Green
        6 taxis, average distance traveled 2037.50
        Minimum distance traveled: 231 km
        Maximum distance traveled: 5012 km

Taxi color Orange
        3 taxis, average distance traveled 950.33
        Minimum distance traveled: 562 km
        Maximum distance traveled: 1509 km

Taxi color Blue
        4 taxis, average distance traveled 1480.75
        Minimum distance traveled: 610 km
        Maximum distance traveled: 3102 km
```

### Sample Run #2 – Input file *taxiInfo2.txt*

```
./taxiStats
Name of input file with raw taxi data (text file)? taxiInfo2.txt
Name of output file for summary data (binary file)? taxi2.dat
Invalid taxi color Purple - skipping this line
Invalid taxi color White - skipping this line
Read 12 taxis in total
Taxi that went the smallest distance: LM44 (color Pink, distance 55 km)
Taxi that went the largest distance: D310 (color Blue, distance 3102 km)
Summary information successfully written to taxi2.dat

./taxiReport
Name of input file with summary data (binary file created by taxiStats)? taxi2.dat
Summary of taxi data
Taxi color Pink
        5 taxis, average distance traveled 771.80
        Minimum distance traveled: 55 km
        Maximum distance traveled: 1435 km

Taxi color Yellow
        1 taxis, average distance traveled 72.00
        Minimum distance traveled: 72 km
        Maximum distance traveled: 72 km

Taxi color Green
        4 taxis, average distance traveled 952.25
        Minimum distance traveled: 231 km
        Maximum distance traveled: 2310 km

Taxi color Orange
        No taxis of this color

Taxi color Blue
        2 taxis, average distance traveled 1856.00
        Minimum distance traveled: 610 km
        Maximum distance traveled: 3102 km
```

**Sample Run #3 – Input file *taxiInfo3.txt***
*(This file has no taxis with the allowed colors, so no summary is printed and no output file is created.)*

```
./taxiStats
Name of input file with raw taxi data (text file)? taxiInfo3.txt
Name of output file for summary data (binary file)? taxi3.dat
Invalid taxi color Purple - skipping this line
Invalid taxi color White - skipping this line
```

**Sample Run #4 – Input file *taxiInfoNone.txt***
*(This file has does not exist.)*

```
./taxiStats
Name of input file with raw taxi data (text file)? taxiInfoNone.txt
Name of output file for summary data (binary file)? taxi.dat
Cannot open input file taxiInfoNone.txt - exiting
```

**Sample Run #5 – Input file *taxi.dat***
*(This file has does not exist.)*

```
./taxiReport
Name of input file with summary data (binary file created by taxiStats)? taxi.dat
Error opening file taxi.dat
```