

Partition class into groups, assign leaders: an algorithm + implementation.

CS 2104 Homework Assignment. Group work.

The Set-up. This is an extension of the problem discussed in class: CS2104 class needs to be partitioned into groups of 3 or 4 students per group, and each group assigned a leader.

The Assignment. This assignment is to be done by each work group as a group assignment.

The Problem; 40 points. Design and implement an algorithm that will partition the class of N (assume $N < 200$) students into groups as indicated above, with each group assigned a single leader from a pre-specified subgroup of $L \leq N$ students of the same class. When the task is impossible, indicate so; the code must output a clear error message. If there are more leaders than needed, some leaders can be unassigned as such. The output should be a single solution, make your own decisions which one. One characteristic of a good algorithm compared to a bad one is that, given the same input, the good one is more likely to produce an acceptable solution.

The program will be written in Java, C, C++, as a single source file named `partition.java` (Java), `partition.c` (C), or `partition.cpp` (C++).

Assume an input file of the following format:

1st column: student name. 2nd column: leader status, "0" or "1". Example for $N = 7, L = 2$:

```
Hemingway 0
Faulkner 1
Fitzerald 0
O'Henry 0
Twain 0
Melville 1
Dickenson 0
```

Generate your own test input files.

The output of the program goes to standard output. The output is a 3-column student list similar to the above, but now with the 3rd column added, which is the group number the student is assigned to, 1,2, 3... etc. Example:

```
Hemingway 0 1
Faulkner 1 1
Fitzerald 0 1
O'Henry 0 2
Twain 0 2
```

Melville 1 2
Dickenson 0 2

(The order of names does not need to match that in the input file).

Submission. The submission for this assignment must be (1) A description of the algorithm, 2 page max. PDF. Preferably with a flow chart. (2) The source file for your program. Example of a C++ code command line execution: `partition -i inputfile .` Each partnership uploads a single source file. The source file should be clearly commented and include the names of all partners. As is always the case with group work, indicate clearly who did what, including who was the group leader.