Assignment 2 – Lab questions on Sorting – Coding (CS 202)

Date: 6th October 2020
Deadline: 19th October 2020, 11:59 PM IST
Instructions:

- Please submit the zip file containing code in cpp and response in pdf format. Also, mention the name and roll number of all group members, and only one submission is required per group.
- For those who have opted for individual submission, you need to mention your name, roll number and group number.
- For each of these questions, please use the input file provided in the input folder). Also, questions of *For Practice (Optional)* section won't be considered for evaluation.

A. You are given time intervals of movies that you can watch during a particular day. You cannot watch two different movies at the same time. What is the maximum number of movies that you can watch with the given time intervals? Assume, both the movies can be watched in case the start time of one activity is the same with the end time of others. The first line in the input format contains the number of movies N, the next N lines contain Si, Ei which are the start and end time of the i^{th} movie.

For example:
(Time intervals: (24-hour format))

6
0 24
0 5
3 7
6 10
12 15
17 19

The maximum number of movies that you can watch is 4 which are with these time intervals

0 5
6 10
12 15
17 19

You need to output only the maximum number. (Please use the input file *coding-question-a.txt* provided.)

B. A box consists of 10000 balls of different colors (please see the file *coding-question-b.txt*, where the number represent the color of the ball). Your task is to arrange balls of different colors such that balls of the same color are placed together and they are arranged in ascending order according to their frequency. (If the frequency of two colors are same, sort them according to their value from lower number color to the higher number color)

Example:

Input: First line is the number of balls.
Next L values in the file are the values for the color of the ball (its range is 0-999)
Example: 7 (Just for example, the actual file contains 10,000 balls)
0 1 3 2 2 3 2
Output: 0 1 3 3 2 2 2

For Practice (Optional):

A. Implement insertion and merge sort for an array of custom objects.
(Please make objects have data fields like age and name and decide the priority of each field.

```
Class Person {
    int age;
    string name;
};
```

For sorting: Sort by ascending order of age. If ages are equal, sort by name. Every person is supposed to have a unique name.)
(Please use the input file *coding-optional-a.txt*)

B. You are given a list of time intervals (input file *coding-optional-b.txt*), which consists of starting time and ending time. (in terms of hours like [8,12] in 10000-hour form,0-9999.)
i.e. for input [a, b] 0<= a, b <= 9,999 and b>=a.
Please write a program to return (output) the list in which you merge the overlapping intervals and output the non-overlapping intervals.
Input: First line is the length of the array (L)
Next L line consists of starting and ending time.
Example for a) 4
1 6
5 12
13 16
15 18
Output = 1 12
13 18