This Programming Assignment is based on Application Exercise 5.7.29:

Suppose you work for a major airline and are given the job of writing the algorithm for processing upgrades into first class on various flights. Any frequent flyer can request an upgrade for his or her up-coming flight using this online system. Frequent flyers have different priorities, which are determined first by frequent flyer status (which can be, in order, silver, gold, platinum, and super) and then, if there are ties, by length of time in the waiting list. In addition, at any time prior to the flight, a frequent flyer can cancel his or her upgrade request (for instance, if he or she wants to take a different flight), using a confirmation code they got when he or she made his or her upgrade request. When it is time to determine upgrades for a flight that is about to depart, the gate agents inform the system of the number, k, of seats available in first class, and it needs to match those seats with the k highest-priority passengers on the waiting list. Describe a system that can process upgrade requests and cancellations in O(log n) time and can determine the k highest-priority flyers on the waiting list in O(k log n) time, where is the number of frequent flyers on the waiting list.

Assignment Description

Describe an algorithm for the New Unknown Airline (NUA) Upgrade System.

Develop a program that processes the request and cancellations for upgrade and provides the list of k-highest priority flyers among the n frequent flyers on the waiting list.

Your implementation must process the request and cancellations in O(logn) time and find the k-highest-priority flyers in O(k logn) times using the data structures in Chapter 5.

In your submission, you must upload two files:

Submit a typed Word or PDF document with description of your solution on Canvas.

Your answers should be very clear, in proper order, and use complete sentences.

Review your work several times before submission to be sure the steps of the algorithm are clearly and properly stated and in the correct order.

Provide pseudocode for the main algorithms, except for user interface, input/output, etc.

Submit a single zip file named NUA\_Upgrade\_System\_Lastname.zip containing the code file and test files.

Here are some further guidelines for programming code:

Use an OOP language, such as Java, Python or C++.

Comment your code.

Your code file must compile and accept any number of inputs in the format you specified.

Since many students are not sure on programming assignment (M4.B4) submission pattern, Below mentioned the considered Input and Output formats. In addition with, I am including few test cases and your code should run against those. These standard format should be followed for other programming assignments as well!

Input:

n = Number of flyers in waiting list

k = Required K highest priority flyers

c = Number of cancellation requests

Now n lines followed with flyers information like, flyer\_name, flyer \_id, the time that flyer came into waiting list (request time) and the Status given to that flyer. So priority will be calculated as the combination of time and Status. The priority is determined FIRST by status, then request time in the waiting list, if there are tie in status, request times break the ties

For the simplicity time will be an integer ranging from 1 to 100000. And Status will be any from the following list [Super, Platinum, Gold, Silver], where

Super > Platinum > Gold > Silver.

Now 'c' lines followed with flyer's id who raised the cancellation request.

Example Input-1

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5 2 1 (n k c)

A 1 120 Platinum (flyer\_name, flyer\_id, time, status)

B 5 60 Super

C 3 140 Super

D 2 130 Gold

E 4 150 Silver

5 (flyer id who raised the cancellation request)

Example Input-2

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4 1 2 (n k c)

A 1 30 Platinum (flyer\_name, flyer\_id, time, status)

B 2 60 Gold

C 3 90 Silver

D 4 120 Super

2 (flyer\_id who raised the cancellation request)

4 (flyer\_id who raised the cancellation request)

Output:

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Output should be top K flyers based on priority, who are allowed to onboard.

Example Output-1

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(C, 3, 140, Super)

(A, 1, 120, Platinum)

Example Output-2

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(A, 1, 30, Platinum)

Please let me know if any doubts regarding the assignment.