Algorithm Analysis Homework 1

Due by 3/19(Fri.) through HISNET

* Grading policy

Remember that correctness is an important criterion, but by no means the whole story. Grades on program will be based on:

1. Correct behavior on typical input: 70%
2. Adherence to specification: 10%
3. Correct behavior on extreme or unusual situations &reasonable recovery from unusual or incorrect inputs.: 15%
4. Readability ~ comments, Mnemonics identifier, clear program structure.: 5%

Write a program that implements min-priority queue. (You should use heap data structure, otherwise you will not get any point for this homework. Also element index should begin from 1, not 0.) Assume maximum heap size is 30. Each element has two fields – name and score. 'name' consists of English alphabet (at most 10 characters) and 'score' is float number between 0.0 and 100.0, and 'score' is a key. In this homework you don't need to check validity of name (i.e. 'name' field consists of alphabet). When your program starts, it repeatedly presents menu until user enters 'Q'.

Following is description of each menu.
I: When this menu is chosen, program asks user's name and score, then inserts element into queue.
D: When this menu is chosen, program removes and displays record of element with smallest score and rebuild queue.
C: When this menu is chosen, program asks index of element and new score of element, then decreases key value of the element and place the element in proper position.
P: When this menu is chosen, program displays all elements in queue.
Q: When this menu is chosen, program gets terminated.

example)

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*********** MENU ****************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: I
Enter name of element: cat
Enter key value of element: 85.4
New element [cat, 85.4] is inserted.


*********** MENU ****************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: I
Enter name of element: dog
Enter key value of element: 92.4
New element [dog, 92.4] is inserted.


*********** MENU ****************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: I
Enter name of element: horse
Enter key value of element: 77.2
New element [horse, 77.2] is inserted.


*********** MENU ****************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: P
[horse, 77.2] [dog, 92.4] [cat, 85.4]


*********** MENU ****************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: D
[horse, 77.2] is deleted.
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********** MENU **************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: P
[cat, 85.4] [dog, 92.4]


********** MENU **************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: I
Enter name of element: frog
Enter key value of element: 43.8
New element [frog, 45.8] is inserted.


********** MENU **************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: C
Enter index of element: 2
Enter new key value: 34.8


********** MENU **************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: P
[dog, 34.8] [frog, 45.8] [cat, 85.4]


********** MENU **************
I : Insert new element into queue.
D : Delete element with smallest key from queue.
C : Decrease key of element in queue.
P : Print out all elements in queue.
Q : Quit

Choose menu: Q
Thank you. Bye!
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* Remember that homework will be graded on various inputs.