CSC2302

Data Structures using C language

Spring 2019

Homework 4_5

This is a homework where you need to put in practice your CSC1401 knowledge and mainly the CSC2302 material we discussed in class about **trees implemented using linked lists, and Heaps implemented using an array**. These are important points to consider:

- All your 5 homework count 15% of your overall grade
- You need to submit your homework Wednesday May 1st before midnight
  - Please note that any homework sent after 00:00 will not be considered: you get a zero as grade
- I need 1 submission from a team where you put your partner in CC
  - You need to submit **two files** named hmk4.c and hmk5.c
- Team => work has to be done together
- Any form of plagiarism will lead to a WF a course grade so please maintain the privacy of your work.

☛ No global variables in the two homework

Homework 4 Specifications

Homework 4 problem is found in slide 17 of Trees chapter and the main algorithm to implement is found in slide 18. Consider the following points:

1. You need to use a text file (called postfix.txt) that holds 1 math expression in a postfix format.
2. You need to provide the user with the following menu where every choice is implemented using a function:
   a. Build the binary tree
   b. Traverse the tree in-order
   c. Traverse the tree pre-order
   d. Print the height of the tree
   e. Quit

Homework 5 Specifications

In this homework you are asked to build a max heap of students requesting a special permission to get enrolled in a closed section during add/drop period.

Let's assume that a student can request a special permission for one of the following reasons:

1. I am in my last semester
2. The course is a prerequisite for many courses I have to take
3. I am taking the course for N times/I am on probation
4. The only 5^{th} course I can take
5. I would like to take the course with this particular instructor

Please refer to this table for a Reason/assignment of points :

Student Reason	Priority Points
I am in my last semester	20
The course is a prerequisite for many courses I have to take	15
Only 5^{th} course I can take	10
I am taking the course for N times/I am on probation	5
I would like to take the course with a particular instructor	0

These are important homework requirements:

- Your heap is an array of type student where every array cell consists of the following members: student_name, ID and priority_pts
- You will provide the user with the following menu choices (where every choice is implemented using a user defined function, including the menu):
  1. Add a student to the heap
  2. Print the list of students requesting a special permission
  3. Grant a sit to student(s)
  4. Overview of Reasons Statistics
  5. Quit
- Initially you will have to build an initial heap from the data found in the file called special_permission_requests.txt
- When the user chooses option 2 from the menu, you need to print the list of students who requested a special permission sorted using heap_sort

- When you add or remove students to/from heap, you are not allowed to use heapify() function used in constructing the initial heap
- When the user chooses option 3 from the menu, you prompt the user for a positive number N that represent the number of students you want to release from the heap and then make sure that you print the list on screen.
- For option 4, you need to display statistical percentages in the following format (note that the statistics are about all requests when you started the program but not the ones currently in the heap!):
  A distribution of special requests reasons:
  …% "I am in my last semester"
  …% "The course is a prerequisite for many courses I have to take"
  …% "Only 5^{th} course I can take "
  …% "I am taking the course for N times/I am on probation"
  …% " I would like to take the course with a particular instructor"