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BS – Information System – 2B

Activity Title: Design Your Heap Challenge

Program Overview

      This C++ program helps manage student entrance exam scores. It allows users to register students by entering their details, such as name, course, and student number. After registration, students are assigned to different groups based on their exam scores. The groups are categorized into three sections: Gifted, Mediocre, and Average. Each section is determined by score ranges, with Gifted for high scores, Mediocre for middle scores, and Average for low scores. The program uses a data structure called a heap to store and sort students within each group. The Gifted and Mediocre groups are sorted by highest score, while the Average group is sorted by lowest score. The program ensures that students are always displayed in the correct order within their sections. Users can view the students in each group at any time. Overall, the program makes it simple to register and organize students based on their entrance exam scores.

How to run the program:

1. **Compile the C++ Program**
2. **Run the program.**
3. **Interact with the program.**

❖ Interacting with the Program in more detail. This part explains what happens when you run the program and how to interact with it by selecting the options from the menu. After you successfully compile and run the program, the program will display the main menu:

=== Entrance Exam Score System ===

1. Register a new student

2. View a student's section

3. Display all class sections

4. Exit

❖ You will interact with this menu by entering a number corresponding to one of the options. Let's break down each option in the menu and the detailed steps for each.

Option 1: Register a New Student

When you select Option 1 to register a new student, the program will ask for the following information:

1. Student's full name: Enter the student's full name. The program will prompt for it and wait for your input.
2. Student's course: Enter the course the student is enrolled in (e.g., Mathematics, Physics, Computer Science).
3. Student's school: Enter the name of the school where the student graduated from.

4. Student's student number: Enter a unique student number (an integer). This number identifies the student in the system.

❖ After you enter the student's details, the program will register the student and store their information in the system. You will receive a confirmation message with the student's name and course, confirming that the registration was successful.

Option 2: View a Student's Section

When you select Option 2, the program will allow you to view a student's section based on their score.

1. Check if a student is registered: If no student has been registered yet (i.e., you haven't used Option 1 to register a student), the program will prompt you to register a student first..

2. Enter student details: If a student is already registered, the program will prompt you to enter:
   o Student's full name: Enter the student's name.
   o Student's course: Enter the course the student is enrolled in.
   o Student's score (0-100): Enter the student's score between 0 and 100. This score will determine which section the student will be placed in.

3. Assign the student to a section: Based on the entered score, the student will be assigned to one of three sections:
   o Gifted Section: If the score is between 85 and 100, the student will be placed in the Gifted Section.
   o Mediocre Section: If the score is between 31 and 84, the student will be placed in the Mediocre Section.
   o Average Section: If the score is between 0 and 30, the student will be placed in the Average Section.

❖ The program will display a message telling you which section the student has been assigned to. The student will be placed into the corresponding section, and the list of students in the sections will be automatically sorted using heaps (either a Max-Heap or Min-Heap, depending on the section).

Option 3: Display All Class Sections

When you select Option 3, the program will display all students in the three sections: Gifted Section, Mediocre Section, and Average Section.

1. Display Gifted Section: The program will show the students in the Gifted Section, sorted by their scores in descending order (from highest to lowest score).

2. Display Mediocre Section: Similarly, the program will show the students in the Mediocre Section, sorted by their scores in descending order (from highest to lowest score).

3. Display Average Section: Finally, the program will show the students in the Average Section, but this time the students will be sorted by their scores in ascending order (from lowest to highest score).

Option 4: Exit the Program

When you select Option 4, the program will print the following message and exit: Exiting the program.

The program will close, and you can either run it again or do something else.