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Subject: Data Structures and Algorithm

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Title: Heroes' Mission Control Heap Challenge

Theme: Help the superheroes manage their mission priorities by organizing tasks using heaps. Use Max-Heaps for the most urgent missions and Min-Heaps for routine ones!

Learning Goals

By completing this challenge, participants will:

1. Master the insertion and deletion of elements in Max-Heaps and Min-Heaps.
2. Learn the Heapify operation to create a valid heap from a random array.
3. Convert between Max-Heaps and Min-Heaps effectively.

Tasks

Task 1: Insert Mission Priorities

Insert superhero missions with their urgency levels (integer values) into a Max-Heap. Display the heap after each insertion.

Task 2: Restore Heap After Removing Root

Write a function to delete the root mission (highest priority) from the Max-Heap and restore the heap property.

Task 3: Convert Missions to Routine Tasks

Convert the Max-Heap into a Min-Heap, which prioritizes less urgent tasks first. Display the heap after the conversion.

Instructions

1. **Input:**
 - Urgency levels for superhero missions, provided as integers (e.g., [50, 20, 70, 10, 40]).
2. **Output:**
 - The heap displayed after each operation (e.g., [70, 40, 50, 10, 20]).
3. **Steps:**
 - Implement functions for insertion, deletion, and heap conversion.
 - Use visuals or print statements like:
"Adding mission with urgency level 70 to the Max-Heap"

Sample Input and Output

Input:

1. Insert: [50, 20, 70, 10, 40]
2. Delete: Remove root.
3. Convert to Min-Heap.

Output:

1. Max-Heap after insertions: [70, 50, 40, 10, 20].
2. After deletion of root: [50, 20, 40, 10].
3. Min-Heap: [10, 20, 40, 50].