ASSIGNMENT NO.12

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//Proram to implement heap sort

import java.util.Scanner;
public class HeapSort {
    public void sort(int arr[])
    {
        int n = arr.length;
        // Build heap (rearrange array)
        for (int i = n / 2 - 1; i >= 0; i--)
            heapify(arr, n, i);
        // One by one extract an element from heap
        for (int i = n - 1; i >= 0; i--) {
            // Move current root to end
            int temp = arr[0];
            arr[0] = arr[i];
            arr[i] = temp;
            // call max heapify on the reduced heap
            heapify(arr, i, 0);
        }
    }
    // To heapify a subtree rooted with node i which is
    // an index in arr[]. n is size of heap
    void heapify(int arr[], int n, int i)
    {
        int largest = i; // Initialize largest as root
        int l = 2 * i + 1; // left = 2*i + 1
        int r = 2 * i + 2; // right = 2*i + 2
        // If left child is larger than root
        if (l < n && arr[l] > arr[largest])
            largest = l;
        // If right child is larger than largest so far
        if (r < n && arr[r] > arr[largest])
            largest = r;
        // If largest is not root
        if (largest != i) {
            int swap = arr[i];
            arr[i] = arr[largest];
            arr[largest] = swap;
            // Recursively heapify the affected sub-tree
            heapify(arr, n, largest);
        }
    }
    /* A utility function to print array of size n */
    static void printArray(int arr[])
    {
        int n = arr.length;
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        for (int i = 0; i < n; ++i)
            System.out.print(arr[i] + " ");
        System.out.println();
    }
    // Driver program
    public static void main(String args[])
    {

Scanner sc=new Scanner(System.in);
        int n;    //Declare array size
            System.out.println("Enter the total number of elements ");
            n=sc.nextInt();     //Initialize array size
            int arr[]=new int[n];   //Declare the array
            System.out.println("Enter the elements of the array ");
             for(int i=0; i<n ;i++)     //Initialize the array
             {
                arr[i]=sc.nextInt();
             }
//int arr[] = { 12, 11, 13, 5, 6, 7 };
//      int n = arr.length;
        HeapSort ob = new HeapSort();
        ob.sort(arr);
        System.out.println("Sorted array is");
        printArray(arr);
    }
}
/* Output

Enter the total number of elements
7
Enter the elements of the array 12
4
5
67
2
56
40
Sorted array is
2 4 5 12 40 56 67
*/
```