05/07/2021 ADA-LABTEST

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Q: Sort a given set of N integer elements using heap Sort technique and compute its time taken.

⇒
```
#include <time.h>
#include <stdio.h>
#include <stdlib.h>

void swap (int *a, int *b)
  {
    int z = *a;
    *a = *b;
    *b = z;
  }
void heap (int arr[ ], int n, int i)
  { int largest = i;
    int l = 2*i + 1;
    int r = 2*i + 2;
   if (l < n && arr[l] > arr[largest])
          largest = l;
   if (r < n && arr[r] > arr[largest])
          largest = r;
      if (largest != i)
    { swap (&arr[i], &arr[largest]);
      heap (arr, n, largest);
    }
}
```


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```
void heapSort (int arr[], int n)
{
    for (int i = n/2 - 1; i >= 0; i--)
        heap (arr, n, i);

    for (int i = n - 1; i > 0; i--)
    {
        swap (&arr[0], &arr[i]);
        heap (arr, i, 0);
    }
}
int main()
{
    clock_t start, end;
    double t;
    for (int n=100; n<601; n= n+100)
    {
        int array[n];
    for (int i = 0; i<n; i++)
    {
        array[i] = rand()%1000;
    }
    start = clock();
    heapSort (array, n);
    end = clock();
    t = ((double)(end - start))/CLOCK_PER_SEC;
    printf("\n Time taken by Heap Sort for %d elements:
    %.2f\n", n, t);
}
```


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* Modification: Using Min heap, Sort the given set of N integers.

```
=> Void minheap (int arr [], int n, int i)
   {
     int smallest = i;
     int l = 2 * i + 1;
     int r = 2 * i + 2;
   if (l < n && arr [l] < arr [smallest])
   if   smallest = l;
   if (r < n && arr [r] < arr [smallest])
        smallest = r;
   if (smallest != i)
           {
             swap (arr [i], arr [smallest]);
             minheap (arr, n, smallest);
           }
   }
   int main ()
       int arr [] = { 4, 6, 3, 1, 7 }
       int n = size of (arr) / size of (arr [0]);
         heap Sort (arr, n);
```


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