

2. Sort a given set of N integer elements using Heap Sort technique and compute its time taken.

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#include <stdio.h>

void heapify(int arr[], int n, int i) {
    int largest = i, left = 2*i + 1, right = 2*i + 2;

    if (left < n && arr[left] > arr[largest]) largest = left;
    if (right < n && arr[right] > arr[largest]) largest = right;

    if (largest != i) {
        int temp = arr[i]; arr[i] = arr[largest]; arr[largest] = temp;
        heapify(arr, n, largest);
    }
}

// Heap sort function
void heapSort(int arr[], int n) {
    for (int i = n/2 - 1; i >= 0; i--) heapify(arr, n, i);
    for (int i = n-1; i >= 0; i--) {
        int temp = arr[0]; arr[0] = arr[i]; arr[i] = temp;
        heapify(arr, i, 0);
    }
}

int main() {
    int n, i;
    printf("Enter the number of elements to sort : ");
    scanf("%d", &n);

    int arr[n];
    printf("Enter the elements to sort : ");
    for (i = 0; i < n; i++) scanf("%d", &arr[i]);

    heapSort(arr, n);

    printf("The sorted list of elements is : ");
    for (i = 0; i < n; i++) printf("%d ", arr[i]);
    printf("\n");

    return 0;
}
```

OUTPUT:

```
PS C:\Users\STUDENT\Desktop\ada lab> gcc hs.c
PS C:\Users\STUDENT\Desktop\ada lab> .\a.exe
Enter the number of elements to sort: 5
Enter the elements to sort: 8 5 6 3 1
The sorted list of elements is: 1 3 5 6 8
```