

LAB-10

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

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

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;
    printf("Enter the number of elements: ");
    scanf("%d", &n);

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

    clock_t start_time = clock();
    heapSort(arr, n);
    clock_t end_time = clock();

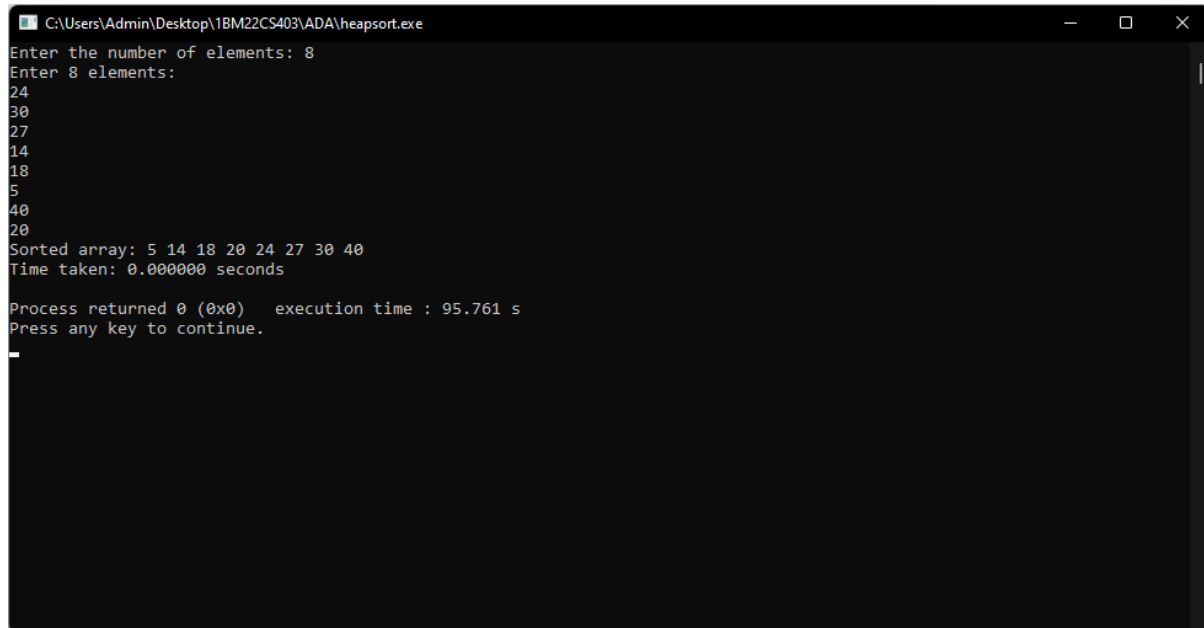
    printf("Sorted array: ");
    for (int i = 0; i < n; i++)
        printf("%d ", arr[i]);
}
```

```
printf("\n");

double time_taken = (double)(end_time - start_time) / CLOCKS_PER_SEC;
printf("Time taken: %f seconds\n", time_taken);

return 0;
}
```

OUTPUT :



The screenshot shows a Windows command prompt window titled "C:\Users\Admin\Desktop\1BM22CS403\ADA\heapsort.exe". The program prompts the user to "Enter the number of elements: 8" and "Enter 8 elements:". The user inputs the numbers 24, 30, 27, 14, 18, 5, 40, and 20. The program then displays the "Sorted array: 5 14 18 20 24 27 30 40" and "Time taken: 0.000000 seconds". At the bottom, it shows "Process returned 0 (0x0) execution time : 95.761 s" and "Press any key to continue.".

```
C:\Users\Admin\Desktop\1BM22CS403\ADA\heapsort.exe
Enter the number of elements: 8
Enter 8 elements:
24
30
27
14
18
5
40
20
Sorted array: 5 14 18 20 24 27 30 40
Time taken: 0.000000 seconds

Process returned 0 (0x0)   execution time : 95.761 s
Press any key to continue.
```