

ADA LAB-1 TEST

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4-D

D3 BATCH

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

```
#include <stdio.h>
#include <time.h>
int temp;
```

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

```
    if (left < size && arr[left] > arr[largest])
        largest = left;
```

```
    if (right < size && arr[right] > arr[largest])
        largest = right;
```

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

```
void heapSort(int arr[], int size)
```

```

{
int i;
for (i = size / 2 - 1; i >= 0; i--)
heapify(arr, size, i);
for (i=size-1; i>=0; i--)
{
temp = arr[0];
arr[0]= arr[i];
arr[i] = temp;
heapify(arr, i, 0);
}
}

```

```

int main()
{
clock_t start,end;
double timetaken;
int rand(void);

int n,i;
printf("Enter the total elements ");
scanf("%d", &n);
int arr[n];
printf("\nThe array elements\n");
for (i = 0; i < n; i++)
{
arr[i]=rand();
printf("%d\t",arr[i]);
}
start=clock();
heapSort(arr, n);

printf("\n");
printf("printing sorted elements\n");
for (i=0; i<n; ++i)
printf("%d\t",arr[i]);

end=clock();
timetaken=((double)(end-start))/CLOCKS_PER_SEC;
printf("\nTime taken = %f",timetaken);

```

```

    return 0;
}

```

input

```

Enter the total elements 20

The array elements
1804289383      846930886      1681692777      1714636915      1957747793      424238335      719885386      1649760492      596516649 1
189641421      1025202362      1350490027      783368690      1102520059      2044897763      1967513926      1365180540      1540383426 3
04089172       1303455736
printing sorted elements
304089172      424238335      596516649      719885386      783368690      846930886      1025202362      1102520059      1189641421 1
303455736      1350490027      1365180540      1540383426      1649760492      1681692777      1714636915      1804289383      1957747793 1
967513926      2044897763
Time taken = 0.000015

...Program finished with exit code 0
Press ENTER to exit console.

```

Q) Minheap modified

```

#include <stdio.h>
#include <time.h>
int temp;

void delay(){
    for (int i=0;i<10000000;i++){
    }
}

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

    if (left < size && arr[left] < arr[smallest])
        smallest = left;

    if (right < size && arr[right] < arr[smallest])

```

```
smallest= right;
```

```
if (smallest != i)
{
    temp = arr[i];
    arr[i]= arr[smallest];
    arr[smallest] = temp;
    heapify(arr, size, smallest);
}
}
```

```
void heapSort(int arr[], int size)
{
    int i;
    for (i = size / 2 - 1; i >= 0; i--)
        heapify(arr, size, i);
    for (i=size-1; i>=0; i--)
    {
        temp = arr[0];
        arr[0]= arr[i];
        arr[i] = temp;
        heapify(arr, i, 0);
    }
    delay();
}
```

```
int main()
{
    clock_t start,end;
    double timetaken;
    int rand(void);

    int n,i;
    printf("Enter the total elements ");
    scanf("%d", &n);
    int arr[n];
    printf("\nThe array elements\n");
    for (i = 0; i < n; i++)
    {
        arr[i]=rand();
    }
}
```

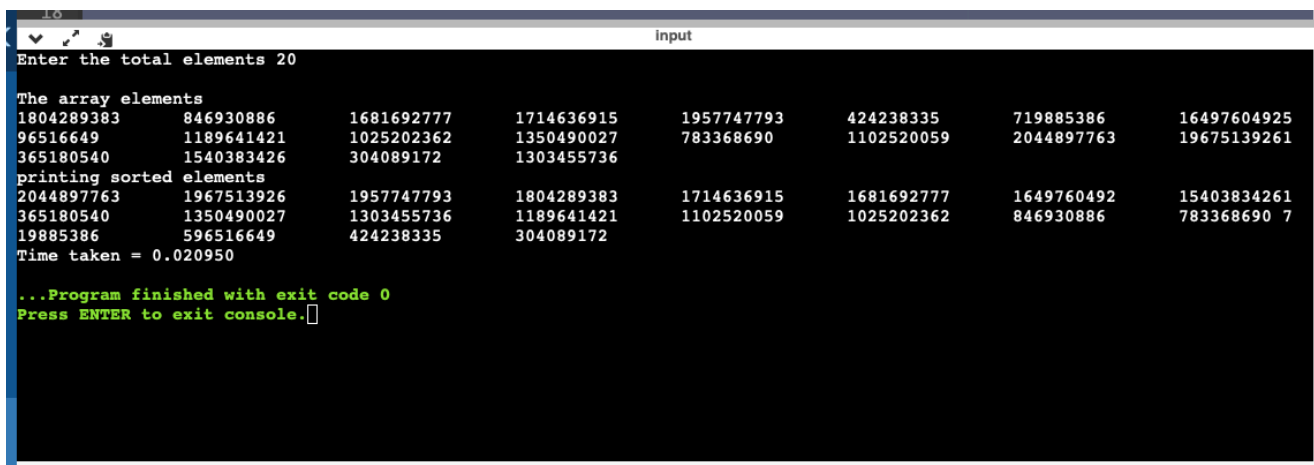
```

        printf("%d\t",arr[i]);
    }
    start=clock();
    heapSort(arr, n);

    printf("\n");
    printf("printing sorted elements\n");
    for (i=0; i<n; ++i)
        printf("%d\t",arr[i]);

    end=clock();
    timetaken=((double)(end-start))/CLOCKS_PER_SEC;
    printf("\nTime taken = %f",timetaken);
    return 0;
}

```



```

input
Enter the total elements 20

The array elements
1804289383      846930886      1681692777      1714636915      1957747793      424238335      719885386      16497604925
96516649       1189641421      1025202362      1350490027      783368690      1102520059      2044897763      19675139261
365180540       1540383426      304089172       1303455736
printing sorted elements
2044897763      1967513926      1957747793      1804289383      1714636915      1681692777      1649760492      15403834261
365180540       1350490027      1303455736      1189641421      1102520059      1025202362      846930886       783368690 7
19885386        596516649      424238335      304089172
Time taken = 0.020950

...Program finished with exit code 0
Press ENTER to exit console.

```