

## //decrease key operation(by creating max heap)

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

```
int n=0;
```

```
void create_max_heap(int arr[]);
```

```
void decrease_key(int arr[],int id,int key);
```

```
void max_heapify(int arr[],int i);
```

```
int main(){
```

```
    int arr[20],i,id,key;
```

```
    printf("enter the size of array(heap): ");
```

```
    scanf("%d",&n);
```

```
    printf("\nenter the array eles\n");
```

```
    for(i=0;i<n;i++){
```

```
        scanf("%d",&arr[i]);
```

```
    }
```

```
    printf("the array(heap) is: ");
```

```
    for(i=0;i<n;i++){
```

```
        printf("%d ",arr[i]);
```

```
    }
```

```
    create_max_heap(arr);
```

```
    printf("\nafter max heapify the array(heap) is: ");
```

```
    for(i=0;i<n;i++){
```

```
        printf("%d ",arr[i]);
```

```
    }
```

```
    printf("\nenter the index of the element to be decreased: ");
```

```
    scanf("%d",&id);
```

```
    printf("\nenter the decreased val: ");
```

```
    scanf("%d",&key);
```

```
    decrease_key(arr,id,key);
```

```
    printf("\nafter decrease key the heap(max heap) is: ");
```

```

        for(i=0;i<n;i++){
            printf("%d ",arr[i]);
        }
        printf("\n");
    }

```

```

void create_max_heap(int arr[]){
    int largest_non_leaf=(n-1)/2;
    for(int i=largest_non_leaf;i>=0;i--){
        max_heapify(arr,i);
    }
}

```

```

void decrease_key(int arr[],int id,int key){
    if(arr[id]<key){
        printf("ERROR:the element is already lesser than key\n");
    }
    else{
        arr[id]=key;
        max_heapify(arr,id); //as key<arr[id],arr[id]<arr[root],so key<arr[root] so no need to
        apply mh from root
    }
}

```

```

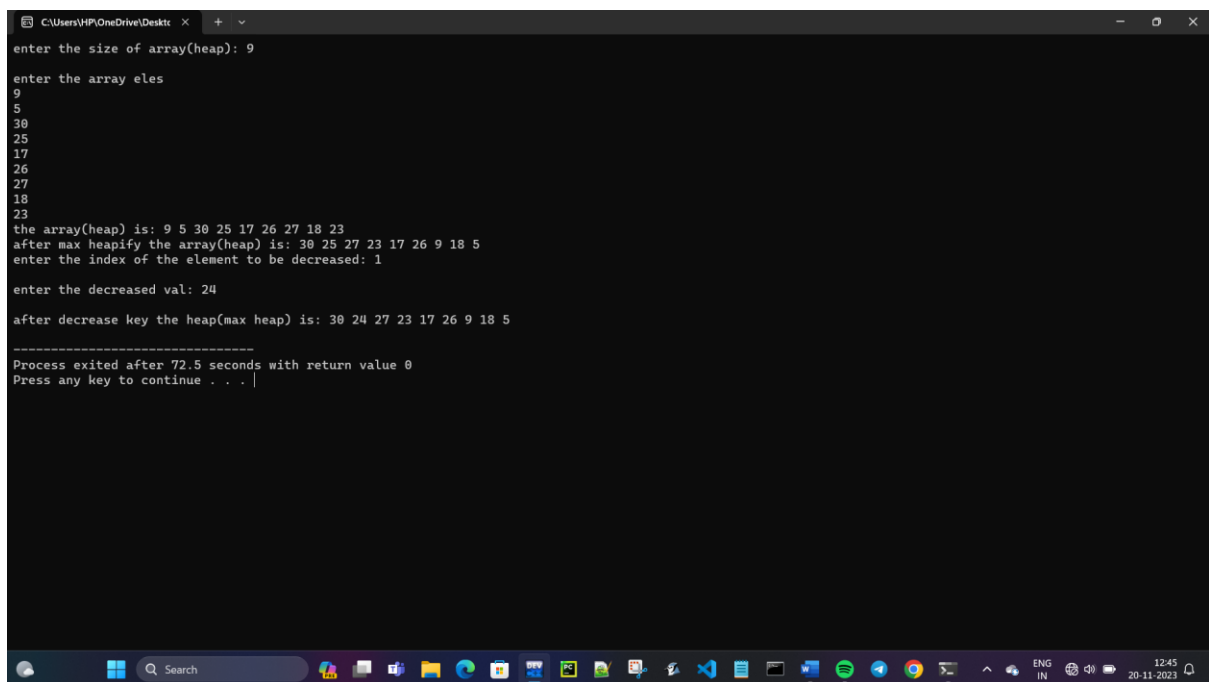
void max_heapify(int arr[],int i){
    int rc,lc,largest;
    lc=2*i+1;
    rc=2*i+2;
    if(lc<n && arr[i]<arr[lc]){
        largest=lc;
    }
}

```

```

else{
    largest=i;
}
if(rc<n && arr[largest]<arr[rc]){
    largest=rc;
}
if(largest!=i){
    int temp=arr[i];
    arr[i]=arr[largest];
    arr[largest]=temp;
    max_heapify(arr,largest);
}
}

```



```

C:\Users\HP\OneDrive\Desktop>
enter the size of array(heap): 9
enter the array eles
9
5
30
25
17
26
27
18
23
the array(heap) is: 9 5 30 25 17 26 27 18 23
after max heapify the array(heap) is: 30 25 27 23 17 26 9 18 5
enter the index of the element to be decreased: 1
enter the decreased val: 24
after decrease key the heap(max heap) is: 30 24 27 23 17 26 9 18 5
-----
Process exited after 72.5 seconds with return value 0
Press any key to continue . . .

```