//insert key operation(by creating max heap)

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#include<stdio.h>
int n=0;

void create_max_heap(int arr[]);
void insert_key(int arr[],int key);
void increase_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 val to be inserted: ");
	scanf("%d",&key);
	insert_key(arr,key);
	printf("\nafter insert key op the heap(max heap) is: ");
	for(i=0;i<n;i++){
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                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 insert_key(int arr[],int key){

        n++;
        arr[n-1]=-99999;
        increase_key(arr,n-1,key);
}

void increase_key(int arr[],int id,int key){
        if(arr[id]>key){
                printf("ERROR:the element is already greater than key\n");
        }
        else{
                arr[id]=key;
           while(id>0 && arr[(id-1)/2]<arr[id])  //as key>arr[id],arr[id]>all eles of that
subtree(root=id),so key>all eles of that subtree(root=id) so no need to apply mh from root to
end,may the increased value is greater then its parent so apply mh to id's parent till root
                {
           int temp=arr[(id-1)/2];
           arr[(id-1)/2]=arr[id];
           arr[id]=temp;
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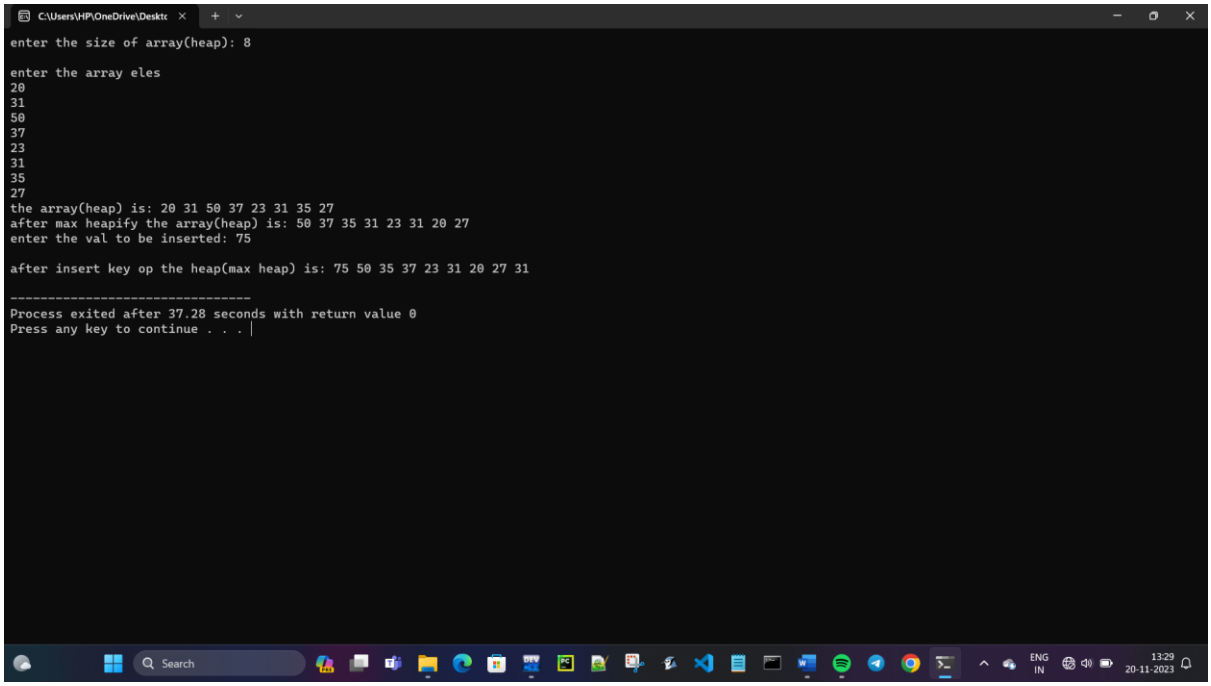
            id=(id-1)/2;
        }
}
}

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\Deskto
enter the size of array(heap): 8
enter the array eles
20
31
50
37
23
31
35
27
the array(heap) is: 20 31 50 37 23 31 35 27
after max heapify the array(heap) is: 50 37 35 31 23 31 20 27
enter the val to be inserted: 75
after insert key op the heap(max heap) is: 75 50 35 37 23 31 20 27 31
Process exited after 37.28 seconds with return value 0
Press any key to continue . . .
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