```c
//sorting.h
#include<stdlib.h>
#define TRUE 1;
#define FALSE 0;
void bubbleSort(int*, int);
void insertionSort(int*, int);
void selectionSort(int*, int);
void mergeSort(int*,int,int);
void heapify(int*,int,int);
void heapSort(int*,int);
void swap(int*, int*);
void merge(int*,int,int,int);
void useMergeSort(int*,int);
void bubbleSort(int* arr, int n){
    for(int i = 0; i < n-1; i++){
        int swapped = FALSE;
        for(int j = 0; j < n-1-i; j++)
            if(arr[j] > arr[j+1]){
                swap(arr+j,arr+j+1);
                swapped = TRUE;
            }
        if(!swapped)
            break;
    }
}
void insertionSort(int* arr,int n){
    for(int i = 1; i < n; i++){
        int key = arr[i];
        int j = i - 1;
        while(j >= 0 && arr[j] > key){
            arr[j+1] = arr[j];
            j--;
        }
        arr[j+1] = key;
    }
}
void selectionSort(int* arr, int n){
    int minIndex ;
    for(int i = 0; i < n-1; i++){
        minIndex = i;
        for(int j = i+1; j < n; j++)
            if(arr[j] < arr[minIndex])
                minIndex = j;
        swap(arr+minIndex,arr+i);
    }
}
void merge(int *arr, int p, int q, int r){
    int n1 = q - p + 1;
    int n2 = r - q;
    int *left,*right;
    left = (int*)malloc(n1*sizeof(int));
    right = (int*)malloc(n2*sizeof(int));
    for(int i = 0; i < n1; i++)
        left[i] = arr[p+i];
    for(int i = 0; i < n2; i++)
        right[i] = arr[q+i+1];
    int i = 0, j = 0, k = p;
    while(i < n1 && j < n2){
        if(left[i] <= right[j]){
            arr[k] = left[i];
```

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            i++;
        }
        else{
            arr[k] = right[j];
            j++;
        }
        k++;
    }
    while(i < n1){
        arr[k] = left[i];
        i++;
        k++;
    }
    while(j < n2){
        arr[k] = right[j];
        j++;
        k++;
    }
}
void mergeSort(int *arr,int p, int r){
    if(p < r){
        int q = p + (r-p)/2;
        mergeSort(arr,p,q);
        mergeSort(arr,q+1,r);
        merge(arr,p,q,r);
    }
}
void useMergeSort(int *arr,int n){
    mergeSort(arr,0,n-1);
}
void heapify(int* arr,int n, int i){
    int max = i;
    int l = 2*i + 1;
    int r = 2*i + 2;

    if(l < n && arr[l] > arr[max])
        max = l;
    if(r < n && arr[r] > arr[max])
        max = r;
    if(max != i){
        swap(arr+i,arr+max);
        heapify(arr,n,max);
    }
}
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--){
        //delete the root and append to last position
        swap(arr,arr+i);
        heapify(arr,i,0);
    }
}
void swap(int* a, int* b){
    int temp = *a;
    *a = *b;
    *b = temp;
}
```

HELPER.H

```c
#include<stdio.h>
#include<time.h>
#include<stdlib.h>
void inputArray(int*,int);
void inputSize(int*);
void outputSortedArray(int*,int);
void outputTimeTaken(clock_t,clock_t);
void useAlgo(void (*algo)(int*,int),int n);
void useAlgo(void (*algo)(int*,int),int n){
    clock_t start,end;
    int *arr;
    arr = (int*)malloc(n*sizeof(int));
    inputArray(arr,n);
    start = clock();
    (*algo)(arr,n);
    end = clock();
    outputSortedArray(arr,n);
    outputTimeTaken(start,end);
    free(arr);
}
void inputArray(int* arr,int n){
    printf("\nEnter %d integers: ",n);
    for(int i = 0; i < n; i++)
        scanf("%d",arr+i);
}
void inputSize(int *n){
    printf("\nArray Size : ");
    scanf("%d",n);
}
void outputSortedArray(int* arr,int n){
    printf("\n");
    for(int i = 0; i < n; i++)
        printf("%d ",arr[i]);
}
void outputTimeTaken(clock_t start,clock_t end){
    float cpu_time;
    cpu_time = ((float)(end-start))/CLOCKS_PER_SEC;
    printf("\nTime taken in ms is %f \n",cpu_time*1000);
}
```

MAIN.C

```c
#include<stdio.h>
#include"./sorting.h"
#include"./helper.h"
#include<stdlib.h>
int main(){
    int n;
    inputSize(&n);
    printf("BUBBLE SORT");
    // useAlgo(bubbleSort,n);
    printf("\nINSERTION SORT");
    useAlgo(insertionSort,n);
    printf("\nSELECTION SORT");
    useAlgo(selectionSort,n);
    printf("\nMERGE SORT");
```

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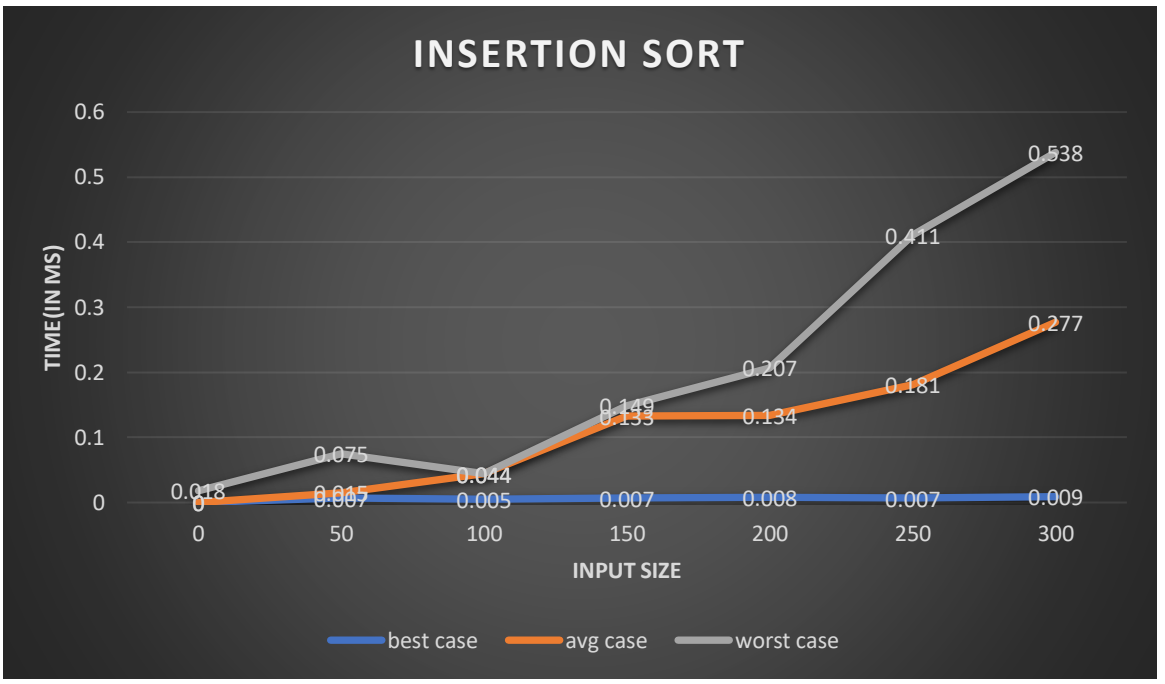
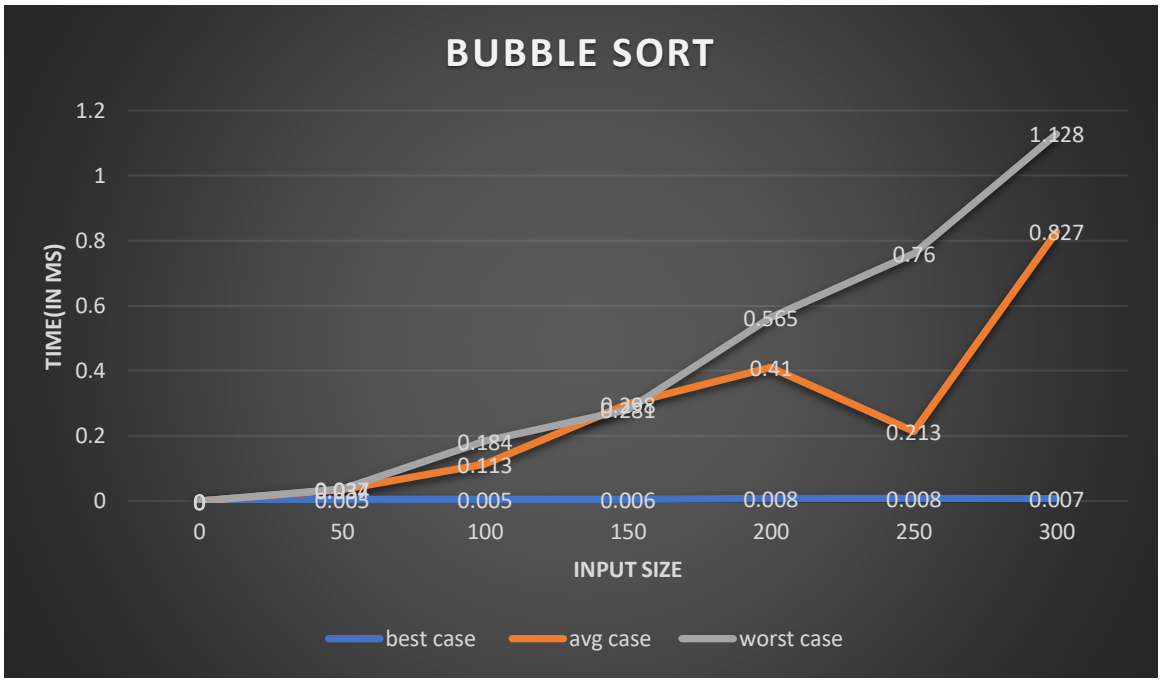
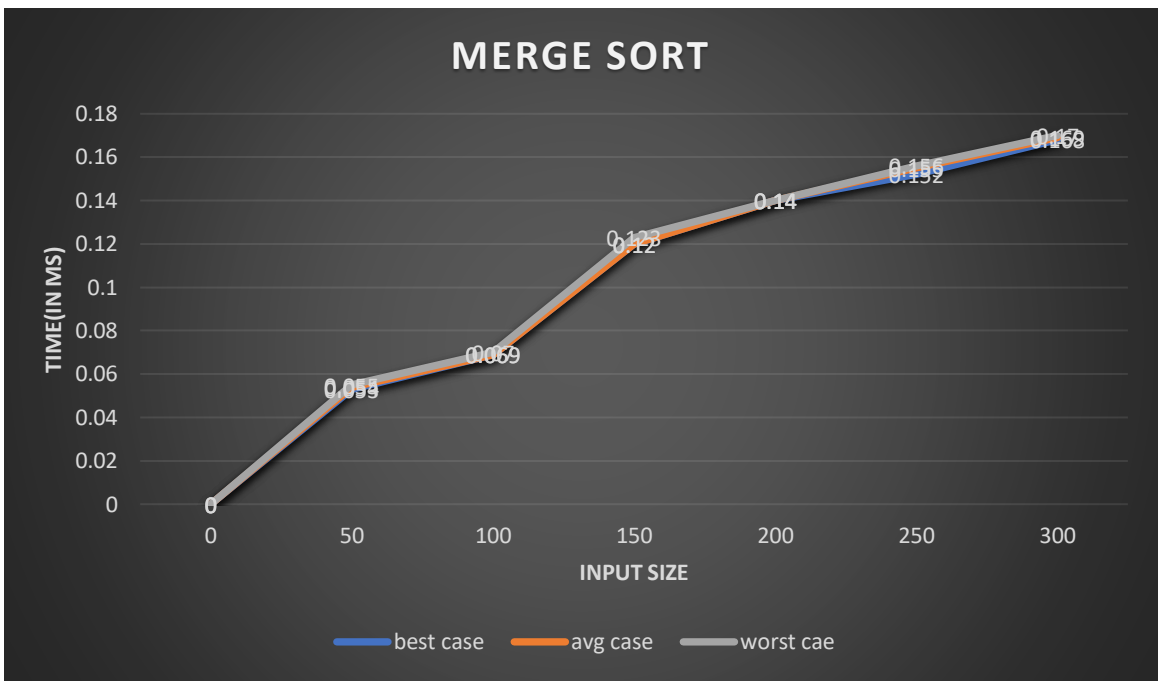
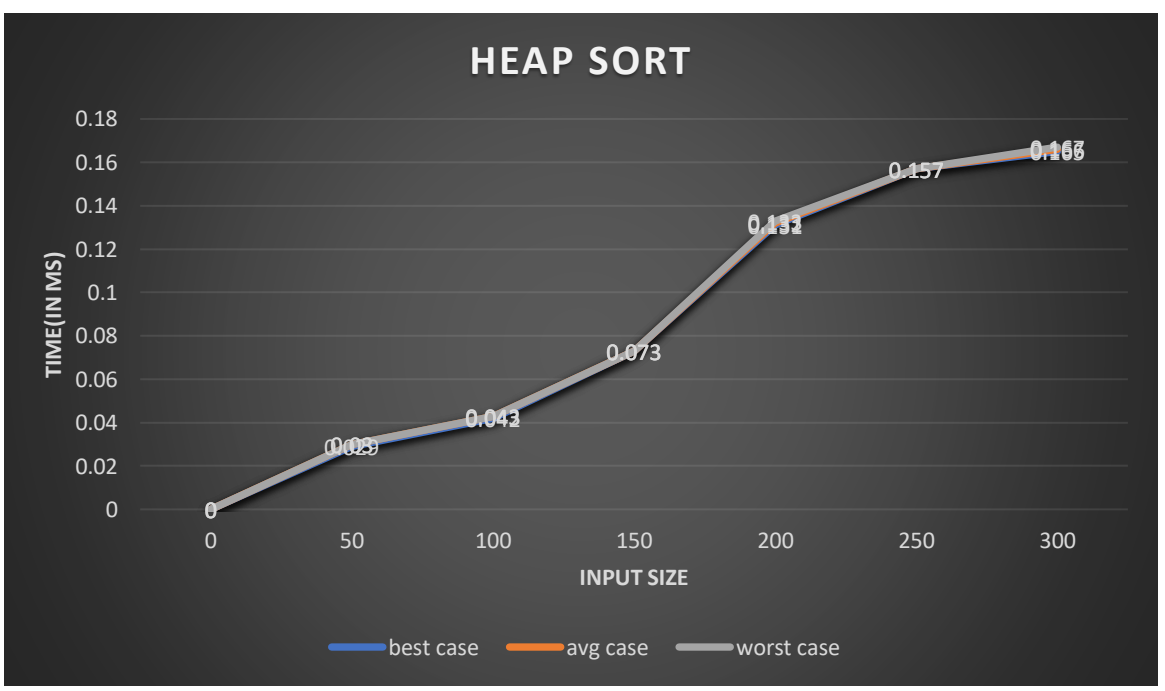
        useAlgo(useMergeSort,n);
        printf("\nHEAP SORT");
        useAlgo(heapSort,n);
        return 0;
    }
```

GRAPHS









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