ADA LAB WEEK 5

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Q1) Sort a given set of N integer elements using the Merge Sort technique. Run the program for different values of N.

```
#include <stdio.h>

void merge(int a[], int low, int high, int mid) {
    int c[high - low + 1];
    int k = 0;
    int i = low;
    int j = mid + 1;

    while (i <= mid && j <= high) {
        if (a[i] < a[j]) {
            c[k++] = a[i++];
        } else {
            c[k++] = a[j++];
        }
    }

    while (i <= mid) {
        c[k++] = a[i++];
    }

    while (j <= high) {
        c[k++] = a[j++];
```

```
    }

    for (int t = low; t <= high; t++) {
        a[t] = c[t - low];
    }
}

void mergesort(int a[], int low, int high) {
    if (low < high) {
        int mid = (low + high) / 2;
        mergesort(a, low, mid);
        mergesort(a, mid + 1, high);
        merge(a, low, high, mid);
    }
}

int main() {
    int n;
    printf("Enter the size of the array: ");
    scanf("%d", &n);

    int a[n];
    printf("Enter the elements of the list:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &a[i]);
    }

    mergesort(a, 0, n - 1);

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

    return 0;  }
```

Output:

```
PS C:\Users\Admin\Desktop\ada>  & 'c
stderr=Microsoft-MIEngine-Error-2jjr
Enter the size of the array: 6
Enter the elements of the list:
3
1
4
2
6
9
Sorted array: 1 2 3 4 6 9
PS C:\Users\Admin\Desktop\ada>
```

```
PS C:\Users\Admin\Desktop\ada>  & 'c:\Users\A
ft-MIEngine-Out-xmol0ove.k2g' '--stderr=Micro
Enter the size of the array: 7
Enter the elements of the list:
1
6
2
7
3
8
4
Sorted array: 1 2 3 4 6 7 8
PS C:\Users\Admin\Desktop\ada>
```

```
PS C:\Users\Admin\Desktop\ada>  & 'c:\Users\Admin\
ft-MIEngine-Out-a3wgwbxh.noa' '--stderr=Microsoft-
Enter the size of the array: 4
Enter the elements of the list:
6
7
3
4
Sorted array: 3 4 6 7
PS C:\Users\Admin\Desktop\ada>
```

Q2) Sort a given set of N integer elements using the Quick Sort technique.

```
# include <stdio.h>
void QuickSort(int a[], int low,int high){
    int mid;
    if(low<high){
        mid=partition(a,low,high);
        QuickSort(a,low,mid);
        QuickSort(a,mid+1,high);
    }
}
int partition(int a[],int low,int high){
    int i=low+1;
    int j=high;
    int temp;
    int pivot=a[low];
    while(i<=j){
        while(a[i]<pivot){
            i++;
        }
        while(a[j]>pivot){
            j--;
        }
        if(i<j){
            temp=a[i];
            a[i]=a[j];
            a[j]=temp;
        }
    }
```

```
    temp=a[low];
    a[low]=a[j];
    a[j]=temp;
    return j;
}

int main(){
    int n;
    printf("Enter the size of the array: ");
    scanf("%d", &n);

    int a[n];
    printf("Enter the elements of the list:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &a[i]);
    }

    QuickSort(a, 0, n-1);

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

    return 0;
}
```

Output:

```
PS C:\Users\Admin\Desktop\ada>  & 'c:\Users\Admin\.vs
stderr=Microsoft-MIEngine-Error-dwcdjovc.fy5' '--pid=
Enter the size of the array: 4
Enter the elements of the list:
2
1
5
3
Sorted array: 1 2 3 5
PS C:\Users\Admin\Desktop\ada>
```

```
PS C:\Users\Admin\Desktop\ada>  & 'c:\Users\A
stderr=Microsoft-MIEngine-Error-1cbnlwg2.qi0
Enter the size of the array: 6
Enter the elements of the list:
2
6
1
3
4
8
Sorted array: 1 2 3 4 6 8
PS C:\Users\Admin\Desktop\ada>
```