DSA LAB

Lab Assignment number 18

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Aim: To implement Merge Sort and Quick Sort

Algorithm:

Merge Sort:

```
Step 1: READ n
Step 2: [INITIALIZE] first =0 ,last = n-1
Step 3: IF first>=last
        RETURN
Step 4: [INITIALIZE] mid = (first+last)/2
Step 5: merge_sort(first,mid)
Step 6: merge_sort(mid+1,last)
Step 7: merge(first,last)
Step 8:EXIT
Merge :
Step 1: [INITIALIZE] mid = (first+last)/2
Step 2: [INITIALIZE] i = first , j = mid+1 , k = first
Step 3: [INITIALIZE] temp[100]
Step 4: Repeat following while i<=mid AND  j<=last
        IF array[i] < array[j]
                SET temp[k++] = array[i++]
        ELSE
                SET temp[k++] = array[j++]
Step 5: Repeat following while i<=mid
        SET temp[k++] = array[i++]
Step 6: Repeat following while j<=last
        SET temp[k++]  = array[j++]
Step 7: [INITIALIZE] i = first
Step 8: Repeat while i<=last
        SET array[i] = temp[i]
        SET i++
Step 9: EXIT
```

Quick Sort:

```
Step 1: READ n
Step 2: [INITIALIZE] first =0 ,last = n-1
Step 3: IF   first<last
        [INITIALIZE] pivot=first , i=first , j=last
        Repeat following while i<j
                Repeat following while array[i]<=array[pivot] AND i<last
                        SET i++
                Repeat following while array[j]>array[pivot]
                        SET  j--
                IF i<j
                        SET temp=array[i]
                        SET array[i]=array[j]
```

SET array[j]=temp
SET temp=array[pivot]
SET array[pivot]=array[j]
SET array[j]=temp

quick_sort(first,j-1)
quick_sort(j+1,last) [END OF IF]
Step 4:EXIT

EXAMPLE:

Array[6] = {1,45,76,22,38,99}

Merge Sort:
[1,45,76,22,38,99]
Dividing and calling merge_sort(1):
([1 ,45,76] [22,38,99])
Dividing and calling merge_sort(2):
(([1,45] [76]) ([22,38][99]))
Dividing and calling merge_sort(3):
((([1][45])[76])(([22][38])[99]))
Calling merge(1):
(([1,45][76])([22,38][99]))
Calling merge(2):
(([1,45,76])([22,38,99]))
Calling merge(3):
[1,22,38,45,76,99]
Sorted array: 1,22,38,45,76,99

Quick Sort:
[1,45,76,22,38,99]
Pivot: 99
[1,45,76,22,38] [99]
Pivot: 38
[1,22,][38] [45,76] [99]
Pivot: 22 Pivot : 76
[1][22][38][45][76][99]
Sorted array: 1,22,38,45,76,99