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COURSE NAME: DATA STRUCTURES FOR MODERN COMPUTING SYSTEMS

COURSE CODE: CSA0302

Experiment 31: Merge Sort

Code:

```
#include <stdio.h>

void merge(int arr[], int left, int mid, int right) {
    int n1 = mid - left + 1;
    int n2 = right - mid;
    int L[n1], R[n2];
    for (int i = 0; i < n1; i++)
        L[i] = arr[left + i];
    for (int j = 0; j < n2; j++)
        R[j] = arr[mid + 1 + j];
    int i = 0, j = 0, k = left;
    while (i < n1 && j < n2) {
        if (L[i] <= R[j]) {
            arr[k] = L[i];
            i++;
        } else {
            arr[k] = R[j];
            j++;
        }
        k++;
    }
    while (i < n1) {
        arr[k] = L[i];
        i++;
        k++;
    }
}
```

```

while (j < n2) {
    arr[k] = R[j];
    j++;
    k++;
}
}

void mergeSort(int arr[], int left, int right) {
    if (left < right) {
        int mid = (left + right) / 2;
        mergeSort(arr, left, mid);
        mergeSort(arr, mid + 1, right);
        merge(arr, left, mid, right);
    }
}

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

int main() {
    int arr[50], n;
    printf("Enter number of elements: ");
    scanf("%d", &n);
    printf("Enter %d elements:\n", n);
    for (int i = 0; i < n; i++)
        scanf("%d", &arr[i]);
    printf("\nUnsorted Array: ");
    printArray(arr, n);
    mergeSort(arr, 0, n - 1);
    printf("Sorted Array (Merge Sort): ");
    printArray(arr, n);
}

```

```
    return 0;  
}
```

Output:

```
Enter number of elements: 5  
Enter 5 elements:  
48  
12  
10  
23  
84  
  
Unsorted Array: 48 12 10 23 84  
Sorted Array (Merge Sort): 10 12 23 48 84  
  
=== Code Execution Successful ===
```