Ex 15: Sorting Techniques

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QUICK SORT:

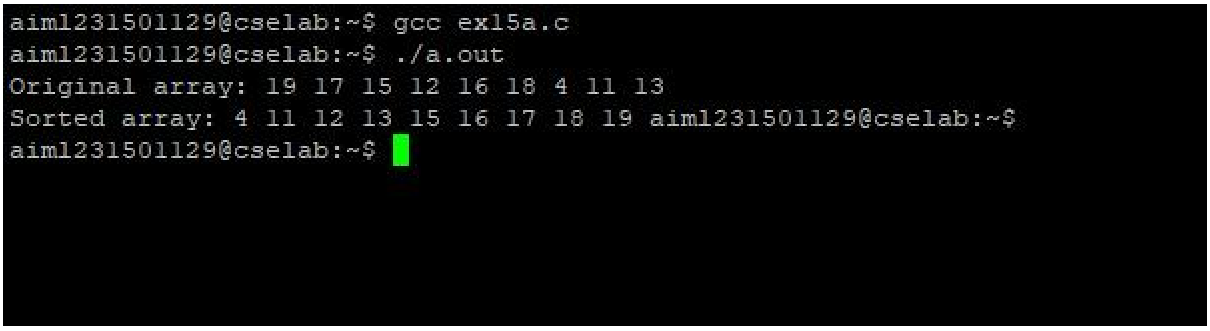
PROGRAM:

```
#include <stdio.h>
void swap(int* a, int* b)
{
	int temp = *a;
	*a = *b;
	*b = temp;
}
int partition(int arr[], int low, int high)
{
	int pivot = arr[low];
	int i = low;
	int j = high;

	while (i < j) {
		while (arr[i] <= pivot && i <= high - 1) {
			i++;
		}
		while (arr[j] > pivot && j >= low + 1) {
			j--;
		}
		if (i < j) {
```

```
            swap(&arr[i], &arr[j]);
        }
    }
    swap(&arr[low], &arr[j]);
    return j;
}
void quickSort(int arr[], int low, int high)
{
    if (low < high) {
        int partitionIndex = partition(arr, low, high);
        quickSort(arr, low, partitionIndex - 1);
        quickSort(arr, partitionIndex + 1, high);
    }
}
int main()
{
    int arr[] = { 19, 17, 15, 12, 16, 18, 4, 11, 13 };
    int n = sizeof(arr) / sizeof(arr[0]);
    printf("Original array: ");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    quickSort(arr, 0, n - 1);
    printf("\nSorted array: ");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
```

```
        return 0;
}
```

OUTPUT:



```
aiml231501129@cselab:~$ gcc ex15a.c
aiml231501129@cselab:~$ ./a.out
Original array: 19 17 15 12 16 18 4 11 13
Sorted array: 4 11 12 13 15 16 17 18 19 aiml231501129@cselab:~$
aiml231501129@cselab:~$
```

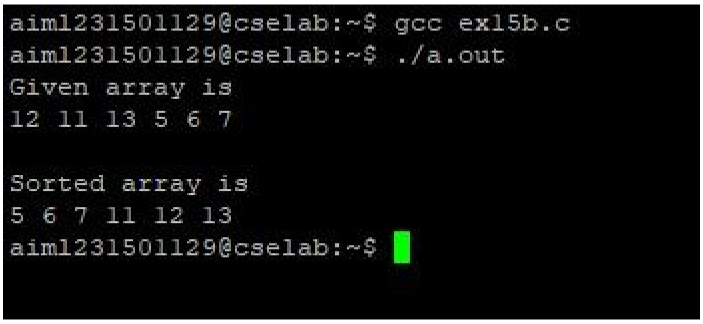
MERGE SORT:

PROGRAM:

```
#include <stdio.h>
#include <stdlib.h>
void merge(int arr[], int l, int m, int r)
{
        int i, j, k;
        int n1 = m - l + 1;
        int n2 = r - m;
        int L[n1], R[n2];
        for (i = 0; i < n1; i++)
                L[i] = arr[l + i];
        for (j = 0; j < n2; j++)
                R[j] = arr[m + 1 + j];
        i = 0;
        j = 0;

        k = l;
        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 l, int r)
{
        if (l < r) {
                int m = l + (r - l) / 2;
                mergeSort(arr, l, m);
                mergeSort(arr, m + 1, r);

                merge(arr, l, m, r);
        }
}
void printArray(int A[], int size)
{
        int i;
        for (i = 0; i < size; i++)
                printf("%d ", A[i]);
        printf("\n");
}
int main()
{
        int arr[] = { 12, 11, 13, 5, 6, 7 };
        int arr_size = sizeof(arr) / sizeof(arr[0]);

        printf("Given array is \n");
        printArray(arr, arr_size);

        mergeSort(arr, 0, arr_size - 1);
        printf("\nSorted array is \n");

        printArray(arr, arr_size);

        return 0;

}
```

OUTPUT:



```
aiml231501129@cselab:~$ gcc ex15b.c
aiml231501129@cselab:~$ ./a.out
Given array is
12 11 13 5 6 7

Sorted array is
5 6 7 11 12 13
aiml231501129@cselab:~$ 
```