COM2002 INTERMEDIATE PROGRAMMING
2024 – 2025 SPRING

Laboratory Week: 31 March – 04 April 2025

Topic : Advanced Uses of Pointers

Program : Sort words (SortWords.c)

Definition : The program that sorts the series of words are entered by the user.

- Read words until an empty string is entered by the user.
- Use *read_line* function in Laboratory 4.
- Store the word into an array but do not forget to allocate memory.
- Check the return value of *malloc()* in case it is unable to allocate requested memory.
- Implement quick sort algorithm which works for an array of strings.

Quick sort: Quicksort is a divide and conquer algorithm. It first divides the input array into two smaller sub-arrays: the low elements and the high elements. It then recursively sorts the sub-arrays. Quicksort partitions an array and then calls itself recursively twice to sort the two resulting subarrays. Using pivot algorithm recursively, we end up with smaller possible partitions. Each partition is then processed for quick sort.

Expected output:

```
Enter word:  tulip
Enter word:  iris
Enter word:  rose
Enter word:  cactus flower
Enter word:  daisy
Enter word:

In sorted order:
 cactus flower
 daisy
 iris
 rose
 tulip
```

Modify the SortWords.c program: *qsort* function which belongs to the *<stdlib.h>* header, is some of the most useful functions in the C library, and requires a function pointer as an argument. *qsort* is a general is a general-purpose sorting function that's capable of sorting any array, based on any criteria that we choose.

Modify the program call the *qsort* function by writing a comparison function. The prototype of the comparison function is *int compare_strings(const void *p, const void *q);*

Modify the SortWords.c program: Try to implement the selection sort algorithm which works for an array of strings instead of quick sort.

Hint : We have studied the selection sort algorithm for an integer array by using pointers in Laboratory 2. You can copy and modify it to be used for an array of strings instead of integers.