COL216 Computer Architecture

Lab Assignment 1 : Sorting strings

Objective

Write a program in ARM assembly language for arranging a sequence of character strings in dictionary order.

Data structure for strings and lists of strings

Strings are null terminated and stored one character per byte. You may assume these to be word aligned, that is, have the starting addresses always a multiple of 4.

A list of strings is stored as an array of string pointers (starting addresses of strings). Pointer to a list means pointer to its starting point.

The program is developed in 3 stages described below.

Stage 1

Write a function for comparing two strings. Comparison in case-sensitive as well as case-insensitive modes should be supported.

Inputs: (i) pointers to the strings and (ii) comparison mode
Result: whether the first string is less than or equal to or greater than the second string

Stage 2

Using the function of stage 1, write a function to merge two sorted lists of strings, maintaining the sorting order. It should support the two comparison modes mentioned above and should also give an option for removing the duplicates. Here strings are not moved or copied. Only a new list of pointers is created.

Inputs: (i) pointers to the operand lists, (ii) operand list sizes, (iii) comparison mode and (iv) duplicate removal option
Result: (i) pointer to the merged list and (ii) size of the merged list

Stage 3

Using the functions of stages 1 and 2, write a recursive merge-sort function.

Inputs: (i) pointer to the unsorted list, (ii) unsorted list size, (iii) comparison mode and (iv) duplicate removal option
Result: (i) pointer to the sorted list and (ii) size of the sorted list

Test programs

At each stage write a main program to test the function. The test programs should take care of all input/output.

Schedule

Last dates for submission are as follows.

Stage 1	22nd January
Stage 2	28th January
Stage 3	3rd February

What should be submitted?

A single zipped file conaining -

- Assembly program file(s)
- Report containing a brief description of the program, test inputs and results