COEN 311 Section W (Computer Organization and Software)

Assignment 5

Due Monday, December 4, 2023

Note: Please submit only one PDF file through Moodle.

Question 1) **(40 points)**

Write a subroutine STRCAT to concatenate two strings. The main program passes the addresses of both the strings by registers to the subroutine. The second string is concatenated to the first string. Note to reserve extra memory space after the first string to hold the resulting concatenated string.
The subroutine STRCAT is to be called twice by the main program.

Question 2) **(40 points)**

Write a complete ARM assembly program to implement bubble sort algorithm of sorting a list of **n** words stored consecutively in memory locations starting from ARRAY. The program should include writing a subroutine bubble_sort whose input parameters (**n**, ARRAY) are passed from the main program using the stack.
Use the bubble_sort algorithm given below:

```
for(i = n-1; i > 0; i--) {
    for(j = 1; j <= i; j++) {
            if(array[j-1] > array[j]){
              //swap them
              temp = array[j-1];
              array[j-1] = array[j];
              array[j] = temp;
            }
    }
}
```

Question 3) **(20 points)**

Rewrite the ARM assembly program to calculate prime number (as given in the class notes) in the form of a macro. This program counts prime numbers in an array using macro. The array ends with a 0 to indicate end of the array. The program takes every element in the array, calls a macro ChkPrime to check if this element is prime, then adds 1 to the counter. The macro shall have 2 parameters: array element (the number) as input, and returns 1 if the number is prime or 0 if it is not. The count of prime numbers is saved in memory location “result”.