SYSTEMS ARCHITECTURE
ARM Assembly Language Programming

Group Assignment (Marks 100, weightage 20%)

PART-I (70 Marks)

Q1. Binary Search Tree Algorithm

ARRAY= [21, 02, 34, 54, 33, 22, 11, 09, 98, 67, 59, 89, 50, 60, 77, 71, 37, 44,47, 93]

(a) Write an ARM assembly language Code to Implement the **Binary Search Tree Algorithm** for searching and finding a **smallest value** and **largest value** from a given ARRAY of 20 elements. Each line/instruction or group of instructions in your program should be explained with proper comments. (**25 Marks**)

(b) Prepare a flow chart diagram of the Binary Search Tree Algorithm, and explain how the assembly language instructions (from Q1 part a) perform the major operations of the BST algorithm? (**10 Marks**)

Q2. Heap sort Algorithm

List= [82, 22, 95, 90, 10, 12, 15, 77, 55, 23]

(a) Write an ARM assembly program that sort a list of 10 unsorted elements using **Heap sort algorithm** into ascending order. Each line/instruction or group of instructions in your program should be explained with proper comments. When you run your program, the memory window should display the unsort list and should show the sorting process in real time. (**25 Marks**)

(b) Prepare a flow of the **Heap sort algorithm**, and explain how the assembly language instructions (from Q2 part a) perform the major operations of the Heap sort algorithm? (**10 Marks**)

PART-II (30 Marks)

To complete the part-II of the assignment, each group need to demonstrate their assignment solutions in a group viva through MS TEAMS. The group viva/demonstration will be scheduled after the deadline of assignment, and the details and arrangement of the group viva/demonstration will be shared in Moodle. (**30 Marks**)

Key Dates
Release Date: 20 November 2021
Submission Deadline: 10 December 2021 @23:59 (GMT+8 Kuala Lumpur)

Marking Scheme
The assignment has two PARTS. Part-I has two questions, which you need to solve, and Part-II is about demonstrating your solutions in a group. Marks are marks are allocated with each part of the questions. Marks will be awarded according to the (i) assembly language programming logic, (ii) program performance, (iii) efficient use of ARM assembly language instructions, (iv) the use of clear comments in the program, and (v) viva/demonstration. Partial marks will be awarded to partially correct/valid answers/explanations.

Late submission will trigger penalty according to the Quality Manual whereby 5 percentage marks would be deducted per day. For example, if a submission is late by 1 day 2 hours, 10% marks will be deducted.