Masterclass in C – Exercise 004

This exercise asks you to develop programs in the MSTC processor's machine's language. Please refer to Machine Language Specification PDF and the solved examples in class. [Session 012 and Session 013 Video Lectures and Notes] You must solve all programs in three stages, as illustrated in session 012. Stage I is a pseudocode level, stage II is machine language using decimal numbers, and stage III is redoing the same work using the binary number system. While storing multi-byte integers in memory when writing programs in stage III, ensure that the least significant byte of the number on paper should be placed in the least address followed by more significant bytes.

Write the programs in the MSTC processor's machine language for the following:

Program 1: Reserve storage for three integers, each 4 bytes long. Set 15674 in the first integer and 8912543 in the second. The summation of the numbers stored in the first two integer memory locations should be stored in the third integer.

Program 2: Reserve storage for three integers, each 4 bytes long. Set 1523899 in the first integer and 845671 in the second. Subtract the number stored in the second integer location from the number first integer location and store the result in the third integer location,

Program 3: Reserve storage for two integers, each 4 bytes long. Set 23877 in the first integer and 98761 in the second integer. Calculate the multiplication of numbers in these two integer locations and reserve the third integer of the required storage to store the multiplication.

Program 4: Reserve storage for two integers, each 2 bytes long. Store 5220 in the first integer and 7 in the second. Divide the number stored in the first integer by the one stored in the second. Reserve TWO MORE integers, one for storing the quotient and the other for storing the remainder for the division and storing the quotient and the remainder in them.

Program 5: Take two integers of length one. Store 40 in the first and 5 in the second. Compute and store addition, subtraction, multiplication, and the quotient after dividing first by the second and the remainder after dividing first by second. Take care of the storage requirements for storing the results of these four operations.

Program 6: Reserve storage for two integers, each two bytes long. Store 43 in the first and 21 in the second.

Step 1: Calculate the multiplication of the two integers.

Step 2: Calculate the addition of the integers.

Step 3: Calculate the quotient and the remainder after dividing the result of multiplication in Step 1 by the result of the addition in Step 2.

Reserve additional storage as per requirement.