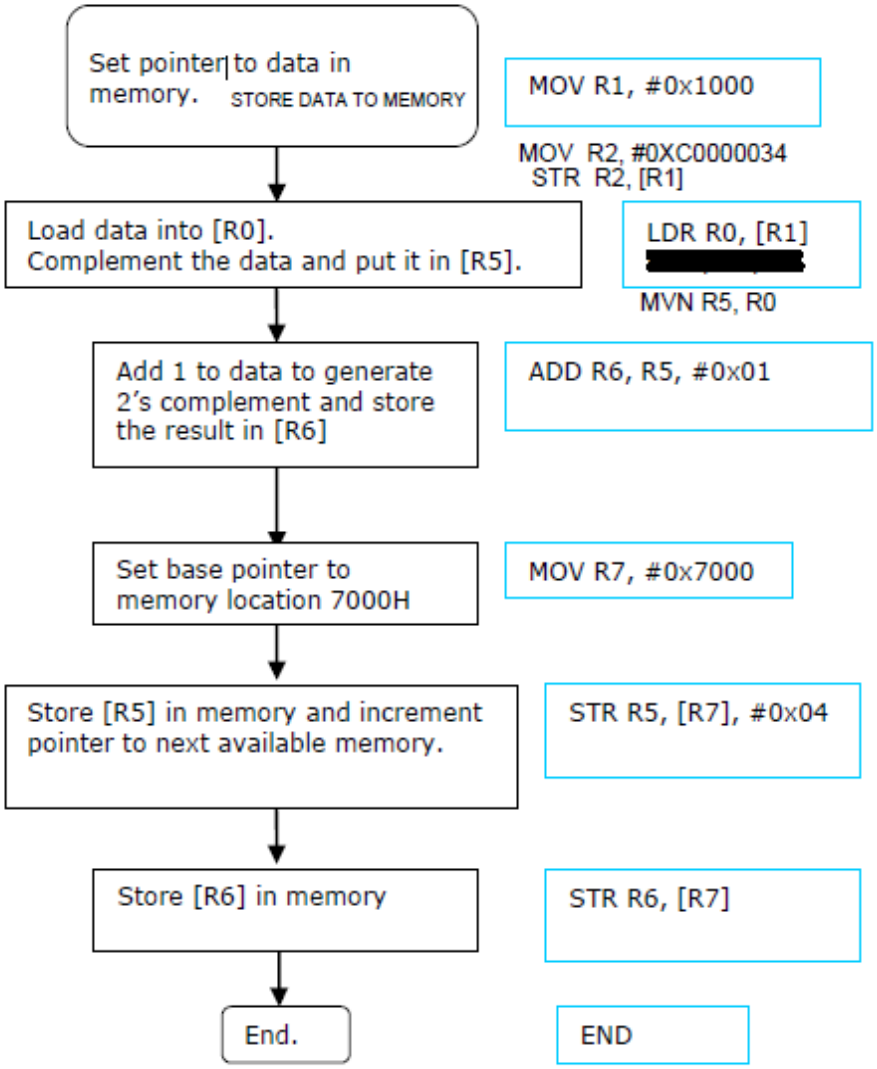
Lab B-04: Programming Exercise 2

1. Write ARM instructions to find the

i. **1's complement and 2's complement of a 32 bit number** in location 'X' and store the result in memory.
ii. **1's complement and 2's complement of a 64-bit number** in locations 'X' and 'X+1' (lower order first followed by higher order) and store the result in consecutive memory locations.

i. 1's complement and 2's complement (32-bit)

a) assume the location 'X' is 1000, and operand is $C0000034_{H.}$
b) assume the output locations for 1's complement and 2's complement of a 32 bit number are 7000 and 7004.



ii. 1's complement and 2's complement (64-bit)
Assume that X = 6300H
Input to program:
If we want to find the 2's complement of the 64-bit number FF00 0000 C000 0034H, then
(6300H) = 0xC0000034 (lower order of the 64-bit number)
(6304H) = 0xFF000000 (higher order of the 64-bit number)
Output of program:
Assume result is stored in 6400H and 6408H (lower order followed by higher order)
(6400H) = 0x3FFFFFCB
(6404H) = 0x00FFFFFF
(6408H) = 0x3FFFFFCC
(640CH) = 0x00FFFFFF

The following questions are to be included in the report only.

2. Perform the following BCD addition operation (one digit of BCD code add with another one digit of BCD code) by writing a program in ARM Assembly Language:
a) Operand 1 is stored in memory location 6000H and Operand 2 is stored in memory location 6004H.
b) Place the result in two consecutive memory locations if the result exceeds the value 10_{BCD}: 7000H and 7004H

3. Perform the following Multiplication and Division by 2 operations by writing a program in ARM Assembly Language:
a) The Operand (assume the operand is one decimal bit, less than or equal to 8_{10}) is stored in memory location 5000H
b) Perform a Multiplication by 2 by performing a logical shift to the left and store the result in memory location 5004H.
c) Perform a Division by 2 by performing a logical shift to the right and store the result in memory location 5008H.

6. Assume that Word 10 contains 20, Word 20 contains 30, Word 30 contains 40, and Word 40 contains 50. Given the above memory values and a one-address machine with an accumulator, what values do the following instructions load into the accumulator?

i) LOAD IMMEDIATE 30
ii) LOAD DIRECT 30
iii) LOAD INDIRECT 30
iv) LOAD IMMEDIATE 10
v) LOAD DIRECT 40
vi) LOAD INDIRECT 10