# CS 4301 RAMM Assembly Language Example Program

- Write a sample RAMM assembly language program that will accept two integers via the keyboard, echo print them, and then determine and print the larger. The code for the implementation is shown below.

```
     STRT  NOP          Mark Motl - Sample RAMM Assembly Language Program
           RDI A        Accept the first integer via the keyboard
           RDI B        Accept the second integer via the keyboard
           PRI A        Echo print the first integer to the screen
  5.       PRI B        Echo print the second integer to the screen
           LDA A        Load the A register with the first integer
           ISB B        Subtract the second integer
           AMJ BBIG     If (A register) < 0, then jump to label BBIG
           LDA A        Else A is larger, place A in the A register
 10. STOR  STA LRGR     Store the contents of the A register at location LRGR
           PRI LRGR     Print the larger of the two integers to the screen
     HALT  HLT          Halt the execution of the program
     BBIG  LDA B        B is larger, place B in the A register
           UNJ STOR     Unconditionally jump to label STOR
 15. A     BSS 0001     Storage for first integer
     B     BSS 0001     Storage for second integer
     LRGR  BSS 0001     Storage for larger integer
           END STRT     End; begin execution at label STRT
```

- The commands to assemble and run this code are shown below.

```
     mmotl@csunix ~/public_html/4301/examples> /usr/local/4301/ramm/rammasm larger.asm
     Assembly Successful
     mmotl@csunix ~/public_html/4301/examples> ls larger*
     larger.asm  larger.lst  larger.ram
  5. mmotl@csunix ~/public_html/4301/examples> cat larger.lst
                 OBJ  LINE    SOURCE CODE     REMARKS
     ERROR   ADDR CODE  NO  LLLLBBOOOBAAAASNBBB
     ================================================================================
              00  5000   1  STRT  NOP          Mark Motl - Sample RAMM Assembly Language Program
 10.          01  6514   2        RDI A        Accept the first integer via the keyboard
              02  6515   3        RDI B        Accept the second integer via the keyboard
              03  6614   4        PRI A        Echo print the first integer to the screen
              04  6615   5        PRI B        Echo print the second integer to the screen
              05  1214   6        LDA A        Load the A register with the first integer
 15.          06  1515   7        ISB B        Subtract the second integer
              07  3712   8        AMJ BBIG     If (A register) < 0, then jump to label BBIG
              08  1214   9        LDA A        Else A is larger, place A in the A register
              09  2016  10  STOR  STA LRGR     Store the contents of the A register at location LRGR
              10  6616  11        PRI LRGR     Print the larger of the two integers to the screen
 20.          11  0000  12  HALT  HLT          Halt the execution of the program
              12  1215  13  BBIG  LDA B        B is larger, place B in the A register
              13  7509  14        UNJ STOR     Unconditionally jump to label STOR
              14  ????  15  A     BSS 0001     Storage for first integer
              15  ????  16  B     BSS 0001     Storage for second integer
 25.          16  ????  17  LRGR  BSS 0001     Storage for larger integer
              17  9900  18        END STRT     End; begin execution at label STRT

     SYMBOL ADDR DEFN REFERENCES:
      A      14    15  2  4  6  9
 30.  B      15    16  3  5  7 13
      BBIG   12    13  8
      HALT   11    12
      LRGR   16    17 10 11
      STOR   09    10 14
 35.  STRT   00     1 18
     Assembly Successful
     mmotl@csunix ~/public_html/4301/examples> cat larger.ram
     5000
```

```
    6514
 40. 6515
    6614
    6615
    1214
    1515
 45. 3712
    1214
    2016
    6616
    0000
 50. 1215
    7509
    ????
    ????
    ????
 55. 9900
    mmotl@csunix ~/public_html/4301/examples> /usr/local/4301/ramm/rammint larger.ram
    Load Successful
    99 at [17]
    Begin Execution at Loc [00]
 60. Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> 2315
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> 4301
    [14] 2315
    [15] 4301
    [16] 4301
 65. Halt 0000 Encountered at Loc [11]
    12 Instructions Executed
    mmotl@csunix ~/public_html/4301/examples> /usr/local/4301/ramm/rammint larger.ram
    Load Successful
    99 at [17]
 70. Begin Execution at Loc [00]
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> 4301
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> 2315
    [14] 4301
    [15] 2315
 75. [16] 4301
    Halt 0000 Encountered at Loc [11]
    11 Instructions Executed
    mmotl@csunix ~/public_html/4301/examples> /usr/local/4301/ramm/rammint larger.ram
    Load Successful
 80. 99 at [17]
    Begin Execution at Loc [00]
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> -001
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> -023
    [14]-0001
 85. [15]-0023
    [16]-0001
    Halt 0000 Encountered at Loc [11]
    11 Instructions Executed
    mmotl@csunix ~/public_html/4301/examples> /usr/local/4301/ramm/rammint larger.ram
 90. Load Successful
    99 at [17]
    Begin Execution at Loc [00]
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> -023
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> -001
 95. [14]-0023
    [15]-0001
    [16]-0001
    Halt 0000 Encountered at Loc [11]
    12 Instructions Executed
100. mmotl@csunix ~/public_html/4301/examples> /usr/local/4301/ramm/rammint larger.ram
    Load Successful
    99 at [17]
    Begin Execution at Loc [00]
    Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> 1234
105. Input a Number in the range [-999..9999] (e.g., 0001, -023, 7823) ==> 1234
```

```
     [14] 1234
     [15] 1234
     [16] 1234
     Halt 0000 Encountered at Loc [11]
110. 11 Instructions Executed
     mmotl@csunix ~/public_html/4301/examples>
```

---

*Time of Request: Mon 16 Dec 2019 11:52:35 AM CST*
*Mark B. Motl*
*Mark.Motl@angelo.edu*