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1 @ Ryan Bentz
2 @ ECE 371
3 @ Programming Assignment 1 - Inline Version
4 @ This program stores 16 bytes that represent values from the ADC and conditions them based on
  a given condition factor
5 @ It takes the 16 conditioned values and calculates the rounded average for those values
6 @ 10/30/2017
7
8
9 .text
10 .global _start
11 _start:
12
13 .equ    COUNT, 16       @ define the counter
14
15 LDR R0, =Fahrenheit_Rough   @ load the address for the rough values array
16 LDR R1, =Fahrenheit_True    @ load the address for the true values array
17
18 @ Determine the correction factor and condition the rough values
19 MOV R3, #COUNT
20
21 CONDITION_VALUES:
22     LDRH R6, [R0], #2   @ load the value from the array and post-index increment the pointer
23
24     CMP R6, #20         @ Compare roughval to the upper limit to the tier
25     MOV R7, #0          @ set the conditioning factor
26     BLS MATCH           @ Branch to end of if-else structure if less than upper limit
27
28     CMP R6, #39         @ Compare roughval to the upper limit to the tier
29     MOV R7, #1          @ Add the conditioning factor
30     BLS MATCH           @ Branch to end of if-else structure if less than upper limit
31
32     CMP R6, #59         @ Compare roughval to the upper limit to the tier
33     MOV R7, #3          @ Add the conditioning factor
34     BLS MATCH           @ Branch to end of if-else structure if less than upper limit
35
36     CMP R6, #79         @ Compare roughval to the upper limit to the tier
37     MOV R7, #7          @ Add the conditioning factor
38     BLS MATCH           @ Branch to end of if-else structure if less than upper limit
39
40     CMP R6, #99         @ Compare roughval to the upper limit to the tier
41     MOV R7, #12         @ Add the conditioning factor
42     BLS MATCH           @ Branch to end of if-else structure if less than upper limit
43
44     CMP R6, #120        @ Compare roughval to the upper limit to the tier
45     MOV R7, #20         @ Add the conditioning factor
46     BLS MATCH           @ Branch to end of if-else structure if less than upper limit
47
48 MATCH:
49     ADD R6, R6, R7          @ Add the conditioning factor to the current rough value
50
51     SUBS R3, #1             @ decrement the counter
52     STRH R6, [R1], #2       @ store the conditioned true value
53     BNE CONDITION_VALUES    @ check if we are at the end of the loop
54
55
56 LDR R0, =AVERAGEVAL         @ load the address for the average value
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57 LDR R1, =Fahrenheit_True    @ load the address for the true values array
58 MOV R3, #COUNT              @ set the loop counter to 16
59 MOV R2, #0                  @ clear the sum register
60
61 SUM_CALC:
62     LDRH R4, [R1], #2       @ load the value from the array and post-index increment the
   pointer
63     ADD R2, R2, R4          @ add the true value to the sum and store it in the same place as
   the sum
64     SUBS R3, #1             @ decrement the counter
65     BNE SUM_CALC            @ check if we are at the end of the loop
66
67
68 MOVS R2, R2, LSR #4     @ divide by 16
69 ADC R2, R2, #0          @ add contents of carry flag
70 STRH R2, [R0]           @ write the average val to memory
71
72 NOP
73 NOP
74
75 .data
76 @ Define the data structures as arrays
77 Fahrenheit_Rough:   .HWORD  0x0F, 0x1E, 0x32, 0x46, 0x5A, 0x6E, 0x00, 0x14, 0x15, 0x27, 0x28,
   0x3B, 0x3C, 0x4F, 0x50, 0x63
78 Fahrenheit_True:    .HWORD  0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
   0x00, 0x00, 0x00, 0x00, 0x00
79 AVERAGEVAL: .HWORD  0x00
80
81
82 .END
83
84
85
```