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19CSE303 Embedded Systems
Lab Worksheet - 3
Memory Access and Looping

Exercise Problems

1. Write a ARM assembly language program instructions to add two 32-bit numbers stored in memory location "value1" and "value2". Store the result in a memory location "result".

```
 AREA data,DATA,READONLY
value1 dcd 0x43
value2 dcd 0x45

 AREA data1,DATA,READWRITE
result dcd 0x00

 AREA exp1,CODE,READONLY
 ldr r0,=value1
 ldr r1,=value2
 ldr r2,[r0]
 ldr r3,[r1]
 add r4,r2,r3
 ldr r5,=result
 str r4,[r5]
e b e

 end
```

2. Write a ARM assembly language program to perform byte addition of an array of numbers. The data bytes are stores in an array starting with memory location “num” and the length of the array is stored in memory location “len”. Store the final result in a memory location “result”.

```
 AREA data,DATA,READONLY
num dcb 0x01, 0x02, 0x03, 0x04
len dcb 0x4

 AREA data1,DATA,READWRITE
result dcd 0x00

 AREA exp2, CODE, READONLY
 ldr r1, =num
 ldr r2, =len
 ldr r3, =result
 mov r4, #0         ;intializing the result register
 ldr r5, [r2]       ;loading len
adding ldrb r6, [r1]       ;loading a byte for addition
 add r4,r4,r6       ; adding the byte
 add r1, r1, #0x01  ; incrementing the address to point to next
byte
 sub r5, r5, #0x01  ; decrementing length by 1
 cmp r5, #0x00      ; checking for length to be zero
 bne adding
 str r4, [r3]
e b e

 end
```

Assignment Problems

1. Write ARM assembly language program to find the number in location “num” is odd or even number. If the number is ODD then store 0x01 in location “result” else move 0x02 in location “result”.
2. Write a ARM assembly program to find the number of 0’s in a byte data stored location “data”. Store the final count in location “count”.
3. Write ARM assembly language program to perform addition of two 64bits numbers. Assume the data is stored in memory locations “data1” and “data2”. Each location will have two 32bit numbers stored. Store the final summation result in location “sum”. Hint: ADC instruction should be used to perform second word addition.