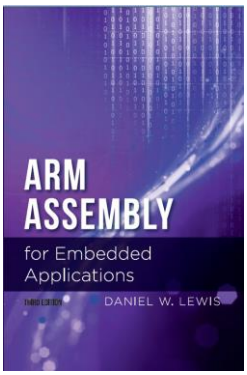

Programming Lab #7

Division by a Constant

Prerequisite Reading: Chapters 1-8
Revised: October 24, 2017

Create an assembly language file containing a total of five functions. Three are used for run-time performance comparisons and are to be implemented exactly as shown below:

```
CallReturnOverhead:     SDIVby13:                UDIVby13:
      BX    LR                MOV   R1,13             MOV   R1,13
                              SDIV  R0,R0,R1           UDIV  R0,R0,R1
                              BX    LR                 BX    LR
```

The remaining two functions (see below) must not use a divide instruction. Instead, you are expected to use a sequence of multiply, shift, add and subtract instructions determined as described below:

```
int32_t  MySDIVby13(int32_t  dividend) ;
uint32_t MyUDIVby13(uint32_t dividend) ;
```

1. Download, compile and execute the C program found here using any C compiler. (It does not have to be EmBitz.) Have the program generate an instruction sequence for signed division by +13. When you run the program, be sure to enter the "+" to produce the sequence for signed division. Use the generated sequence to implement your assembly language function, MySDIVby13.

2. Run the program again, but this time do not enter the "+" so that it will produce the sequence for unsigned division. Use the generated sequence to implement your assembly language function, MyUDIVby13.

3. Test your code using EmBitz to build a program consisting of your assembly language code and the C main program found here.

If your code is correct, the display should look like the image to the right. The numbers are the execution times in clock cycles. Functions that calculate incorrect quotients will have their cycle counts displayed as white text on a red background.

ARM Assembly
for Embedded Applications

Dividend	SDIV	MySDIV	UDIV	MyUDIV
FFFFFF80	15	17	9	5
FFFFF800	16	17	9	5
FFFF8000	17	17	9	5
FFF80000	18	17	9	5
FF800000	19	17	9	5
F8000000	20	17	9	5
80000000	21	17	9	5
08000000	20	17	8	5
00800000	19	17	7	5
00080000	18	17	6	5
00008000	17	17	5	5
00000800	16	17	4	5
Average	18	17	8	5

Lab 7: Division by a Constant