CMSC 411 – Project – assigned 11/15/2016, revision 3

[100 points]

Teams: Form groups of 4 each.

Task:

Using the ARM simulator (ARM, write code that computes addition, subtraction, and multiplication of floating point numbers without using ARM floating point operations or registers but still using IEEE-754. Given 2 numbers in the decimal number format diagrammed below, convert to IEEE-754, compute the 3 results, and compare your results against ARM's embedded floating point functions. Also, compute the CPI of each function.

Format: 1 sign bit, 15 binary bits for integer part, 16 binary bits for fraction part = 32 bits
(not two's complement)

Range: +32767.65535 to -32767.65535

+100.000	=	0	000 0000 0110 0100	.	0000 0000 0000 0000
-100.000	=	1	000 0000 0110 0100	.	0000 0000 0000 0000
-32767.65535	=	1	111 1111 1111 1111	.	1111 1111 1111 1111
+32767.65535	=	0	111 1111 1111 1111	.	1111 1111 1111 1111
0	=	0	000 0000 0000 0000	.	0000 0000 0000 0000

Proposed steps:

1) Read 2 numbers in format above from memory
2) Convert numbers to IEEE-754 and store in memory
3) Do ADD, SUB, and MUL on the numbers
4) Estimate CPI of your code
5) Use the numbers from step 2 and compute FP solution of ADD, SUB, and MUL using ARM's FP operations.
6) Estimate CPI of the ARM code

Schedule:

Thursday 8 Dec, 5.29pm: (1) Assembly code due on Blackboard.
(2) Documentation due on Blackboard as PDF
- No changes allowed after submission.

Thursday 8 Dec, 5.30 – 8.19pm: 7 min demonstration, in Charlie's office ITE-344
- See Schedule for Demonstration post for details
- Bring one hard copy of final report at demonstration
- Bring your own peer review at demonstration

Grading:

Source code: **30%**
- Commented
- Extra credit (decimal-related conversion) (5%)

Oral presentation & demonstration: **30%**
- 7 minutes
  - Approach, Code discussion, Issues and solutions, Results, and Demonstration

Final report: **30%**
- CPI computations
- All implemented algorithms must be described.
- Show sample input and output data
- Show ARM floating point results and explain the difference.

Peer review: **10%**

Due 12/8/2016 or sooner