

ICS 233, Term 072

Computer Architecture & Assembly Language

Quiz# 6

Date: Wednesday, April 30, 2008

Q.1. What is the decimal value of the following single-precision floating-point number?

0100 0100 1011 0000 0000 0000 0000 0000

$$\begin{aligned}
 &= + (1.011000\dots0)_2 * 2^{(137-127)} = + (1.011000\dots0)_2 * 2^{10} \\
 &= + 1.375 * 2^{10} \\
 &= + 1408
 \end{aligned}$$

Q.2. Show the single precision binary representation for: -24.0625.

$$24.0625 = (11000.0001)_2 = (1.10000001)_2 * 2^4$$

$$\text{Exp.} = 4 + 127 = 131$$

Single precision binary representation:

1100 0001 1100 0000 1000 0000 0000 0000

Q.3. Perform the following floating-point operation rounding the result to the nearest even. Perform the operation using **guard**, **round** and **sticky** bits.

1100 0010 0000 0000 0000 0001 0100 0000
 + 0100 0110 0000 0000 1000 0000 0000 0000

We add three bits for each operand representing G, R, S bits as follows.

-	1.000	0000	1000	0000	0000	0000	000	x	2^{13}	
-	1.000	0000	0000	0001	0100	0000	000	x	2^5	
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-	1.000	0000	1000	0000	0000	0000	000	x	2^{13}	
-	0.000	0000	1000	0000	0000	0001	010	x	2^{13}	(align)
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+	01.000	0000	1000	0000	0000	0000	000	x	2^{13}	
+	11.111	1111	0111	1111	1111	1110	110	x	2^{13}	(2's complement)
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	00.111	1111	1111	1111	1111	1110	110	x	2^{13}	
= +	0.111	1111	1111	1111	1111	1110	110	x	2^{13}	
= +	1.111	1111	1111	1111	1111	1101	100	x	2^{12}	(normalize)
= +	1.111	1111	1111	1111	1111	1110	x	2^{12}		(round)