

Bradley Grose

$$1) P1 = 1 \cdot 10 + 3 \cdot 20 + 4 \cdot 30 + 2 \cdot 40 = \\ 10 + 60 + 120 + 80 = 2.7 \text{ Global CPI}$$

$$P2 = 4 \cdot 10 + 5 \cdot 20 + 6 \cdot 30 + 2 \cdot 40 \\ 40 + 100 + 180 + 80 = 4 \text{ Global CPI}$$

$$a) P1 = \frac{3 \cdot 10^9}{2.7} = 1.11 \cdot 10^9 \text{ instructions per second} \\ P2 = \frac{4 \cdot 10^9}{4} = 1.00 \cdot 10^9 \text{ instructions per second}$$

$$b) \begin{cases} P1 = 2.7 \text{ CPI} \\ P2 = 4 \text{ CPI} \end{cases}$$

Therefore P1 is faster

$$c) \frac{10^4}{1.11 \cdot 10^9} = 9 \text{E-6 seconds for P1} \\ \frac{10^4}{1 \cdot 10^9} = 1 \text{E-5 seconds for P2}$$

$$2a) 500(1) + 150(5) + 100(5) + 100(2) = 500 + 750 + 500 + 200 = 1950 \text{ Cycles}$$

$$\frac{1950}{2 \text{E9}} = 9.75 \text{E-7 seconds}$$

$$b) \frac{1950}{500 + 150 + 100 + 100} = 2.294 \text{ CPI}$$

$$c) 500(1) + 150(5) + 50(5) + 100(2) = 1700 \text{ cycles}$$

$$\frac{1700}{2 \text{E9}} = 8.5 \text{E-7} \quad \frac{8.5 \text{E-7}}{9.75 \text{E-7}} = 13\% \text{ speed up}$$

$$\frac{1700}{500 + 150 + 50 + 100} = 2.125 \text{ CPI}$$

$$d) 250(1) + 75(5) + 100(5) + 100(2) = 1325 \text{ cycles}$$

$$\text{Time: } \frac{1325}{2 \text{E9}} = 6.625 \text{E-7 seconds} \quad \frac{6.625 \text{E-7}}{9.75 \text{E-7}} = 32\% \text{ speed up}$$

$$\frac{1325}{250 + 75 + 100 + 100} = 2.524 \text{ CPI}$$

3)

leaf - procedure:

add \$t0, \$a0, \$a1

addi \$t1, \$a0, -2

add \$t0, \$t0, \$t1

move \$v0, \$t0

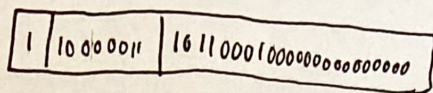
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$$4) -27.0625$$

$$= \text{Sign} = 1$$

$$2^4 < 27 \leq 2^5$$

$$\text{So } 4+127=131$$



$$.0625 \cdot 2 = .125$$

$$.125 \cdot 2 = .25$$

$$.25 \cdot 2 = .5$$

$$.5 \cdot 2 = 1$$

$$\begin{array}{r} 27.0625 \\ -16 \\ \hline 11.0625 \end{array}$$

$$\frac{1}{128} \quad \frac{0}{64} \quad \frac{0}{32} \quad \frac{0}{16} \quad \frac{0}{8} \quad \frac{0}{4} \quad \frac{1}{2} \quad \frac{1}{1}$$

10000011

A

Exp

1100 0001 1101 1000 1000 0000 0000 0000
C I D 8 8 0 0 0

$$\frac{1}{8} \quad \frac{0}{4} \quad \frac{1}{2} \quad \frac{1}{1} \quad \frac{0}{.5} \quad \frac{0}{.25} \quad \frac{0}{.125} \quad \frac{1}{.0625}$$

0xC1D88000

$$5) 0xC0A80000$$

C 0 A 8 0 0 0 0
1100 0000 1010 1000 0000 0000 0000₂

$$\frac{1}{\text{Sign}}$$

$$\frac{10000001_2}{129}$$

$$\frac{2^4 8^6}{010100000000000000000000}$$

$$\frac{1}{4} + \frac{1}{16} = \frac{5}{16} = .3125$$

So negative

$$-1 (1.3125) \cdot 2^{129-127} = -5.25$$