

Dept. of Computer Science and Engineering

EECS2021
 Computer Organization
 Quiz 1 – 20 minutes
 Oct. 7 2015

Question 1 – 6 points

A CPU with a clock rate of 1GHz is running 2 different compilations of the same program,

Compiler 1 produces 1×10^9 instructions and runs in 2.2 seconds

Compiler 2 produced 1×10^9 instructions and runs in 1.8 seconds

Find the average CPI of both runs

If you know that for the first compilation, the CPI for integer operations is 1, for load/store 4 what is the CPI for branches? (Assume that the percentage of integer instructions is 40%, the percentage of load/store instructions is 30%).

$$T = IC \times CPI \times TC$$

$$CPI_1 = \frac{T}{IC \times TC} = \frac{T \text{ Rate}}{IC} = \frac{2.2 \times 10^9}{10^9} = 2.2$$

$$CPI_2 = \frac{1.8 \times 10^9}{10^9} = 1.8$$

$$2.2 = 1(0.4) + 4(0.3) + CPI_{br}(0.3)$$

$$CPI_{br} = 2$$

Question 2 – 4 points

Represent the following numbers in binary with the corresponding number of bits, if you cannot state the reason why?

- 7 as unsigned number in a 3-bit format

111

- -7 as a signed in a 3-bit format

Cannot

- 6 as a signed number in 8-bit format

0000110

- -9 as a signed number in 8-bit format

9 = 00001001

-9 = $\begin{array}{r} 11110110 \\ \hline 11110111 \end{array}$