

Example: which one has higher MIPS?

1) 32-bit processor @ 400MHz clock = 2.50 nsec

1 inst / 4 clock cycle \rightarrow CPI = 4

Find MIPS For this processor

$$\begin{aligned} \text{MIPS} &= \frac{\text{Million Inst}}{\text{sec}} = \frac{1 \text{ inst}}{4 \text{ cycle}} \times \frac{1 \text{ cycle}}{2.5 \times 10^{-9} \text{ sec}} \times \frac{\text{million}}{10^6 \text{ inst}} \\ &= \frac{1}{4 \times 2.5 \times 10^{-9} \times 10^6} = \frac{1}{10 \times 10^{-9} \times 10^6} = \boxed{100} \end{aligned}$$

consider another case with slower clock freq. but fast ^{*} FP/sec

2) 64-bit processor @ 200MHz clk = 5×10^{-9} sec = 5 nsec

1 inst / 2 clock cycles CPI = 2

$$\begin{aligned} \text{MIPS} &= \frac{\text{million Inst}}{\text{sec}} = \frac{1 \text{ inst}}{2 \text{ cycle}} \times \frac{1 \text{ cycle}}{5 \times 10^{-9} \text{ sec}} \times \frac{1 \text{ Million Inst}}{10^6 \text{ inst}} \\ &= \frac{1}{10 \times 10^6 \times 10^{-9}} = \frac{1}{10^{-2}} = \boxed{100} \end{aligned}$$

note that in this case we are actually calculating MFLOPS because we are assuming a 16-bit instructions.

* FP/sec floating point (16-bit instruction size) / sec