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Consider two different CPU implementations, P1 and P2, with the same instruction set architecture. The instructions can be divided into four classes according to their CPI (class A, B, C, and D). P1 with a clock rate 2.5 GHz and CPIs of 1, 2, 3, and 3, and P2 with a clock rate of 3 GHz and CPIs of 2, 2, 2, and 2. Given a program with an instruction count of 1M instructions divided into classes as follows: 10% class A, 20% class B, 50% class C, and 20% class D, which implementation is faster?

$$T = \frac{IC \times CPI}{f}$$

$$P_1 = \frac{(10^6 \times 0.1) \times 1 + (10^6 \times 0.2) \times 2 + (10^6 \times 0.5) \times 3 + (10^6 \times 0.2) \times 3}{2.5 \text{ G}} = \frac{2.6}{2.5} \text{ ms}$$

$$P_2 = \frac{10^6 \times 2}{3 \text{ G}} = \frac{2}{3} \text{ ms} \quad \therefore T_{P_1} > T_{P_2}$$

$$\Delta = P_2 \quad \#$$