

AC-PROBLEMES-6.pdf



Arnau_FIB



Arquitectura de Computadores



2º Grado en Ingeniería Informática



**Facultad de Informática de Barcelona (FIB)
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Estudiar sin publi es posible.

Compra Wuolah Coins y que nada te distraiga durante el estudio.



①

$$a) \text{ CPI} = \frac{1c}{4i} = 0.25 \text{ c/i}$$

$$b) 20 \cdot 4 = 80 \text{ instr} \rightarrow \text{20 cycles}$$

$$c) \text{ CPI} = 0.25 + 0.2 \text{ stalls/i} \cdot 20 \text{ cycles} = 4.25 \text{ c/i}$$

$$d) S = \frac{4.25}{0.25} = 17 \text{ veces más lento}$$

$$e) \text{ CPI} = 0.25 + 0.05 \cdot (0.2 \cdot 20) = 0.45 \text{ c/i}$$

$$f) \text{ Speedup} = \frac{4.25}{0.45} = 9.44$$

②

$$a) \text{ IPC} = \frac{10^9}{10^9} = 1 \text{ i/c} \quad \text{OPC} = 1 \text{ i/c} \cdot 4 \text{ op/i} = 4 \text{ op/c}$$

$$b) \text{ IPC} = 4 \text{ ops/c}$$

$$c) 10^9 \cdot (1 + 0.4 \cdot 1) = 1.4 \cdot 10^9 \text{ ciclos}$$

$$d) \text{ IPC} = \frac{10^9 \text{ instr}}{1.4 \cdot 10^9 \text{ c}} = 0.714 \text{ i/c} \quad \text{OPC} = 2.85 \text{ op/c}$$

$$e) p = \frac{4}{16} = 0.25$$

$$f) 10^9 (1 + 0.25 \cdot 0.4 \cdot 1) = 1.1 \cdot 10^9 \text{ c}$$

$$g) \text{ IPC} = 0.91 \text{ i/c} \rightarrow \text{OPC} = 3.63 \text{ op/c}$$

$$③ a) S_m = \frac{1}{1 - 0.85} = 6.67 \quad b) t(N) = 30 + \frac{170}{N} + 0.05 \cdot 200 \cdot N$$

$$c) t' = 1 - \frac{170}{N^2} \rightarrow t' = 0 \rightarrow N = \sqrt{170} = 13 \text{ procesadores}$$

$$d) S = \frac{200}{30 + 26} = 3.57 \quad e) S = \frac{200}{10 + \frac{20}{10}} = 1.1$$

$$f) \frac{20}{10(0.5 \cdot 4 + 0.5 \cdot 1)} = S_h \quad g) S = \frac{200}{10 + 26 + 5} = 4.88$$

$$h) \text{ MIPS} = \frac{648 \cdot 10^3}{10^6 \cdot 100 \cdot 3600} = 9000 \text{ MIPS}$$

$$\text{FLOPS} = \frac{72 \cdot 10^8}{10^6 \cdot 100 \cdot 3600} = 1000 \text{ FLOPS}$$

$$j) \text{ PC} = \frac{1000}{13.90} = 8133 \text{ MFLOPS/W}$$

$$\text{SC} = \frac{987}{13.90 + 10 \cdot 30} = 3.32 \text{ MFLOPS/W}$$

$$i) \text{ MIPS} = (648 + 13) \cdot 10^3 / (10^6 \cdot 211 \cdot 3600) = 44783 \text{ MIPS}$$

$$\text{FLOPS} = (72 \cdot 10^8) / (10^6 \cdot 41 \cdot 3600) = 48787 \text{ FLOPS}$$

$$k) \frac{4878 \text{ MFLOPS}}{\left(\frac{90 \cdot 1 \cdot 10}{41} + \frac{20 \cdot 12 \cdot 26}{41} \cdot \frac{30 \cdot 10 \cdot 5}{41}\right)} = 6.09$$

$$S = \frac{6.09}{3.52} = 1.73$$

