

3.2 - Exercícios propostos

9) a) $IPC = \frac{1}{CPI} = \frac{1}{\frac{T_{exec}}{N_{inst} \times T}} = \frac{N_{inst} \times T}{T_{exec}}$

$$IPC_1 = \frac{20 \times 10^9 \times \frac{1}{2}}{7 \times 10^9} = 1,43$$

$$IPC_3 = \frac{90 \times 10^9 \times \frac{1}{3}}{9 \times 10^9} = 3,33$$

$$IPC_2 = \frac{30 \times 10^9 \times \frac{1}{1,5}}{10 \times 10^9} = 2$$

b) $T_{exec} = N_{inst} \times CPI \times T \Rightarrow T_2 = \frac{T_{exec}}{N_{inst} \times CPI_1} \Rightarrow T_2 = \frac{7 \times 10^9}{30 \times 10^9 \times 0,5}$

$$\Rightarrow T_2 = 0,47 \quad f = \frac{1}{T} = \frac{1}{0,47} = 2,1 \text{ GHz}$$

e) $T_{exec} = N_{inst} \times CPI \times T \Rightarrow N_{inst} = \frac{T_{exec}}{CPI \times T} \Rightarrow N_{inst} = \frac{9 \times 10^9}{0,5 \times \frac{1}{1,5}}$

$$\Rightarrow N_{inst} = 2,7 \times 10^{10}$$

$$\textcircled{10} \text{ a) } T_{\text{exec}} = N_{\text{inst.}} \times \text{CPI} \times T = \frac{N_{\text{inst.}} \times \text{CPI}}{F}$$

$$\text{CPI}_1 = 0,10 \times 1 + 0,20 \times 2 + 0,50 \times 3 + 0,20 \times 4 = 2,8$$

$$T_{\text{exec}_1} = \frac{2,8 \times 10^6}{1,5} = 1,87 \text{ ms}$$

$$\text{CPI}_2 = 0,10 \times 2 + 0,20 \times 2 + 0,50 \times 2 + 0,20 \times 2 = 2$$

$$T_{\text{exec}_2} = \frac{2 \times 10^6}{2} = 1 \text{ ms Logo, o processador } P_2 \text{ é mais rápido.}$$

$$\text{b) } \text{CPI}_1 = 0,10 \times 1 + 0,20 \times 2 + 0,50 \times 3 + 0,20 \times 4 = 2,8$$

$$\text{CPI}_2 = 0,10 \times 2 + 0,20 \times 2 + 0,50 \times 2 + 0,20 \times 2 = 2$$

$$\text{c) } \text{CPI}_1 = \frac{n^\circ \text{ ciclos}_1}{N_{\text{instruções}_1}} \Leftrightarrow n^\circ \text{ ciclos}_1 = 2,8 \times 10^6 \text{ ciclos}$$

$$\text{CPI}_2 = \frac{n^\circ \text{ ciclos}_2}{N_{\text{instruções}_2}} \Leftrightarrow n^\circ \text{ ciclos}_2 = 2 \times 10^6 \text{ ciclos}$$

$$\textcircled{11} T_{\text{exec}} = N_{\text{inst.}} \times \text{CPI}_1 \times T \Leftrightarrow 1 = \frac{N \times 1}{4 \times 10^9} = 4 \times 10^9$$

$$T_{\text{exec}} = N_{\text{inst.}} \times \text{CPI}_2 \times T \Leftrightarrow 1 = \frac{N \times 2}{6 \times 10^9} = 3 \times 10^9$$