CDA3101 – F13 – Quiz #2  Fri 24 Sept 2013

Given: Instruction Types A, B, and C on $M_1$

$CPI_A = 1.1$; $CPI_B = 2.7$; $CPI_C = 1.9$

Q1 (7 pts): What is Average CPI of $M_1$ for program $P_1$ with 32% Type A instructions, 27% Type B, and the remainder Type C instructions? Also, average CPI of $M_1$ for $P_2$ with 29% Type A instr's, 17% Type B, and remainder Type C instr's?

Q2 (13 pts): Let machine $M_1$ have clock rate = 2.8 GHz. Given CPIs for $P_1$ and $P_2$ (from Q1), and IC = 100, calculate $t_{exe}$ for $P_1$ and $P_2$. Which is faster?

20 pts total – You have 20 minutes to complete

CDA3101 Quiz 2 Solution

Q1:

$CPI_{P_1} = 0.32(1.1 \frac{Cyc}{inst}) + 0.27(2.7 \frac{Cyc}{inst}) + 0.41(1.9 \frac{Cyc}{inst}) = 1.86 \frac{Cyc}{inst}$

$CPI_{P_2} = 0.29(1.1 \frac{Cyc}{inst}) + 0.17(2.7 \frac{Cyc}{inst}) + 0.54(1.9 \frac{Cyc}{inst}) = 1.80 \frac{Cyc}{inst}$

Q2:

Runtime = $\frac{CPI \cdot IC}{Clock \ Rate}$

$Runtime = (CPI) \cdot (IC) \cdot (Clock \ Period)$

$Runtime_{P_1} = \frac{CPI_{P_1}(100 \ instr)}{2.8 \ GHz} = \frac{(1.86 \frac{Cyc}{instr})(100 \ instr)}{2.8 \ GHz} = 66.4 \ ns$

$Runtime_{P_2} = \frac{CPI_{P_2}(100 \ instr)}{2.8 \ GHz} = \frac{(1.80 \frac{Cyc}{instr})(100 \ instr)}{2.8 \ GHz} = 64.4 \ ns$

P2 is faster.