

Solutions for Tutorial 1, CSSE3001

4.19: Original time for FP: 5s

Therefore new time for FP: 1s

New total time = 6s

Speedup = $10/6 = 1.67$

4.20: Original time = 100s

Speedup = 3

Therefore new time = 33.3s

$100 - 33.3 = 66.7$ = time improved by using enhanced FP

This is 0.8 of the time taken by FP originally (for every 1 sec originally, now it takes 0.2 sec, so a saving of 0.8)

Therefore original FP time = $66.7 / 0.8 = 66.7 * (5/4) = 83.3s$

And check!

4.35: For program P: MIPS(MFP):

$$CPI = (0.1*6 + 0.15*4 + 0.05*20 + 0.7 * 2) = 3.6$$

@ 1000MHz, we have 10^9 cycles per second, so

$$MIPS(MFP) = 1000/3.6 = 277.7$$

MIPS(MNFP):

$$CPI = (0.1*30*2 + 0.15*20*2 + 0.05*50*2 + 0.7*2) = 18.4$$

@ 1000MHz, this gives us:

$$MIPS(MNFP) = (0.1*30+0.15*20+0.05*50+0.7)*1000/18.4 = 500$$

4.36: Of the 300million, 10% are FP mult, 15% FP add, and 5% FP divide.

There are $0.7*300 = 210$ million regular integer instructions.

Total instruction count:

$$210 + 30*30 + 45*20 + 15*50 = 2760 \text{ million instructions}$$

4.37: Exe time: MFP:

$$\begin{aligned} \text{Total cycles} &= (210*2 + 30*6 + 45*4 + 15*20) * 10^6 \\ &= 1080 \text{ million cycles} \end{aligned}$$

$$\text{Total time} = 1.08s$$

Exe time MNFP:

$$\begin{aligned} \text{Total cycles} &= 2760 * 2 * 10^6 \\ &= 5520 \text{ million cycles} \end{aligned}$$

$$\text{Total time} = 5.52s$$