

Homework-1 (CMPEN 431)

8/29/2017

1. (20 pts) Explain the dangers of utilizing only a subset of the performance equation as a performance metric. Use examples if necessary.

2. (20 pts) Computer-A executes the MIPS ISA and computer-B executes the x86 ISA. On average, programs can execute as 1.5 times MIPS instructions as x86 instructions. Computer-A has an average CPI of 1.5 and computer-B an average CPI of 3. If computer-B runs at a 3GHz clock frequency, what frequency does computer-A have to run at to be at least as fast as computer B? (assuming that they run same number of instructions)

3. (20 pts)

i. Calculate the effective CPI of this configuration:

Type	CPI for type	Frequency
arith/logic	4	40%
load	5	30%
store	3	10%
branch	3	20%

ii. If the clock frequency of this machine is 2.5 GHz, calculate its average MIPS (millions instructions per second) rate.

4. (20 pts) Which type of instruction is the performance bottleneck for the program/machine with the following characteristics?

Type	CPI for type	Frequency
load	4	30%
store	6	10%
add	2	40%
mul	12	8%
div	40	2%
cond branch	4	8%
uncond branch	2	2%

5. (20 pts) Considering a computer running a program that requires 250 sec, with 80 sec spent in executing FP (floating point) instructions. By how much is the total time reduced if the time taken by the FP operations could be reduced by 40% (e.g., by employing a faster FP execution unit)?