



CSC 320: Computer Organization
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Assignment # 1
Due: February 19, 2015

Problem 1:

Computer A has an overall CPI of 1.3 and can be run at a clock rate of 600MHz. Computer B has a CPI of 2.5 and can be run at a clock rate of 750 Mhz. We have a particular program we wish to run. When compiled for computer A, this program has exactly 100,000 instructions. How many instructions would the program need to have when compiled for Computer B, in order for the two computers to have exactly the same execution time for this program?

Problem 2:

Suppose you have a machine which executes a program consisting of 50% floating point multiply, 20% floating point divide, and the remaining 30% are from other instructions.

- (a) Management wants the machine to run 4 times faster. You can make the divide run at most 3 times faster and the multiply run at most 8 times faster. Can you meet management's goal by making only one improvement, and which one?
- (b) Dogbert has now taken over the company removing all the previous managers. If you make both the multiply and divide improvements, what is the speed of the improved machine relative to the original machine?

Problem 3:

Use the register and memory values in the table below for the next questions. Assume a 32-bit machine. Assume each of the following questions starts from the table values; that is, DO NOT use value changes from one question as propagating into future parts of the question.

| Register | Value | Memory Location | Value |
|----------|-------|-----------------|-------|
| R1 | 12 | 12 | 16 |
| R2 | 16 | 16 | 20 |
| R3 | 20 | 20 | 24 |
| R4 | 24 | 25 | 28 |

- a) Give the values of R1, R2, and R3 after this instruction: add R3, R2, R1
- b) What values will be in R1 and R3 after this instruction is executed: load R3, 12(R1)
- c) What values will be in the registers after this instruction is executed: addi R2, R3, #16