

CSC 220 Homework #2

Due Monday April 10, 2006

1. Our author notes that improvements in RAM or main memory speed have helped RISC architecture performance as compared to CISC. Why?
2. Page 132, problem 8... Instead of a 6-bit number, can you tell me how many "trits" are needed to hold an 8-bit number, or a byte.
3. Page 133, problem 12... also, how many address bits are needed to access this memory given that the smallest thing I can access is a byte.
4. If I have 16 bits (that's 2^4 bits for those of you keeping score at home) of data that I want to encode using the Hamming code algorithm for single bit error correction (ala the example on pages 76-77), then what is the overhead of this approach, or the percentage of my word that must be dedicated to check bits? What is the overhead if my data has 256 bits? And in the general case, n bits?
5. Page 133, problem 23... heck this is a math/physics problem, but it is fun. Speaking of fun, if you get an answer for this problem, then tell me something... using this level of compression, how much storage would you need to video the next 10 years (including the remaining exciting 8 weeks of 220!) of your life at this resolution?
6. Page 134, problem 26... this used to be a nice engineering (and marketing!) workaround when memory was expensive, and hint: the answer's right in the chapter, eh.
7. Page 134, problems 32 & 33... a couple of digital camera questions that are just poser math/physics questions

8. Finally, some trivia... the section is in brackets. Keep it short and sweet:

- a) If I need to speed up my compute environment by 100x, would you suggest I try instruction-level parallelism (pipelining) or processor-level processing? [2.1]
- b) If an address has n bits, then how many words can be addressed? [2.2]
- c) What is the relationship between the locality principle and caching? [2.2]
- d) What is the difference between a unified cache and a split cache? [2.2]
- e) Draw the cylinder, sector and track a disk/hard drive. [2.3]
- f) When you're not listening to your MP3 player, does your CD spin at a constant velocity? Explain why. [2.3]
- g) What kind of mouse are you using right now: mechanical, optical, or opto-mechanical? Explain. [2.4]
- h) I told a buddy that my mouse's mickey was 2-3 feet. He didn't believe me. Do you? Explain. [2.4]
- i) What is halftoning? [2.4]
- j) Draw the three modem communication modes: amplitude modulation, frequency modulation, and phase modulation. [2.4]
- k) Pictures stored in JPEG format are compressed. That's cool, but what is the downside of this? [2.4]
- l) Does your internet browser support ASCII, Unicode or both? [2.4]