Problem Set 2: Hardware and Software

due Wednesday, 18 October 2006, by 5:30 P.M. ET

You must submit this problem set via upload to the dropbox on the course's website.

The First Thing To Go Is Memory. (20 points.)

1. As you furiously type the answers to this problem set the night before it's due, you decide to do a little research by watching some of the course's podcast. You load iTunes and start playing the video when you become distracted and decide to simultaneously check your email, chat on an instant messaging program, and check your grade on Problem Set 1 on the course's website. All of a sudden you receive the following error message: "Your system is low on virtual memory." What is virtual memory? What might this error message mean? Suggest two ways to solve this problem.

Email ASAP. (20 points.)

2. Your mother is tired of calling you and decides to remedy the situation by purchasing a top-of-the-line machine for the sole purpose of sending you daily emails with new photos of her cat. She decides to purchase a computer with specifications identical to yours except that it has a 2GHz dual-core CPU instead of your 2GHz single-core CPU. She boasts that her machine is twice as fast as yours. Is she correct? Why or why not? Explain when dual cores might be beneficial.

Yesterday's "The World of Tomorrow" Today. (20 points.)

3. Suffice it to say that personal computers, now ubiquitous throughout much of the world, have had no small impact. In one or more paragraphs, what other current technological forces do you see impacting history and society in a global way now and in the near future?

The Age-Old Question. (20 points.)

4. Even though the newest Macintosh computers now run on hardware that's extremely similar to other Windows PCs, you still cannot run Windows programs on Macintosh systems unless there exists a version of the software for the Mac OS. This is because the software that you use on your machine is just as dependent on the operating system as it is on the hardware that it is run on. Many programs have versions for both Windows and the Mac OS, but there are certain pieces of software that can only be run on one OS or the other.

Let's assume that you've decided to be adventurous with your next computer purchase and have bought a new Mac with an Intel CPU. However, for work you have to install and use Microsoft Access, a Windows-only database application. In your spare time you enjoy first-person-shooter, graphics-intensive games that are only available on Windows. You research your options and find that there exist at least two different solutions:

i. Dual-booting, whereby you install both Windows and Mac OS on different "partitions" on your hard drive so that, at startup, you can choose to boot into Windows instead of Mac OS via a menu.
ii. Running virtualization software that allow you to run Windows as a "program" (inside its own window) on top of Mac OS.

Which of these options would you choose for running Microsoft Access? Would you choose the same option to play your graphics-intensive game? In a paragraph, explain your reasoning behind each of your choices.

Nerd Power. (20 points.)

5. Suppose that you own an "experienced" computer with an 800MHz CPU, 256 MB of RAM, and a 20GB HDD. You're constantly using this computer to type up homework for your favorite Extension School course, and so you're frequently saving files to your hard disk. But, even with a 20GB drive, you're pretty tight on disk space, so you tend to delete files a lot, particularly homework-related files as soon as you've printed them out. Moreover, you like to play games, so you're always installing and, two wasted weeks later, uninstalling the latest and greatest shoot-'em-ups.

   Over time, you notice that it's taking progressively longer to save and open files on this computer as well as to install new programs. But your CPU is still running at 800 MHz. You still have 256 MB of RAM. Your hard drive can still hold 20 GB. So why in the world might your system be slowing down? How might you solve this problem, short of buying a better computer? Technically speaking, why might your solution work?

Extra Credit. (5 points.)

6. Who is Linus Torvalds? Why do some people love to hate him? Why can't some people live without him?