

## Problem Set 4: Hardware, Software, and the Internet

*due Thursday, 10 November 2005, by 5:30 P.M. ET*

This problem set requires Internet access and a trip to a computer store. Realize that it is somewhat longer than past problem sets. But it's terrific fun.

### The Journey Reloaded. (15 points.)

1. In problem 15 of Problem Set 3, you described what happens when you visit your mom's blog. Suppose that, right after you've installed a brand new wireless router to share your broadband signal with everybody in the household, you settle down in front of your computer to check out your mom's latest updates and see how she spent her day (without you). But you are unable to get to her site!

Describe in a few paragraphs what might have gone awry from the time you hit "Enter" after inputting `mom.com` into your browser to the moment at which the error message "You tried to access the address `http://mom.com/`, which is currently unavailable" appears on your screen. Be sure to incorporate (intelligently), at least, each the following terms into your answer: browser, DHCP, DNS, domain, firewall, IP address, Internet, ISP, port, router, server, and TCP/IP. Please underline the first instance of each of these terms in your response.

### Short Answers. (5 points each.)

*Please answer each of the following questions in one or more sentences.*

2. Suppose that you've just upgraded your Internet connection from a 56K modem to a cable modem. Why might you notice that the speed of your Internet connection slows down around 6:00 P.M. everyday?
3. Suppose that you find an image on the Web that you want to use in your final project's website. You right click on the image and save it to your desktop. Have you just uploaded the image or downloaded it?
4. Suppose that you want to place an image on `fas.harvard.edu` (where your website will be hosted). And, so, you use an SFTP program to transfer the image from your local machine to your account. Have you just uploaded the image or downloaded it?

5. You already know that you can access CNN's website by visiting `http://www.cnn.com/`. But you can also access the site by visiting `http://64.236.16.116/`, because 64.236.16.116 is the IP address of one of CNN's web servers. That is, `http://64.236.16.116/` is a fully functional URL. Why does CNN never advertise its Web address as `http://64.236.16.116/`? That is, explain in one or more sentences why it's a good idea to refer to Web servers by their fully qualified domain names (*e.g.*, `www.cnn.com`) rather than by their IP addresses (*e.g.*, 64.236.16.116).

### Reviewing Reviews. (15 points.)

6. You know how to build a LAN. You know how to surf the Web. It's now time to unite these skills in search of the perfect LAN (equipment), with a little help from a website that helps people like you make informed purchasing decisions.

Suppose that you have a couple of PCs with NICs at home and you want to get these two machines on the Internet as quickly as possible. You've got yourself a cable modem already, but your ISP only provides you with one IP address. And your friend has just recommended that you buy yourself a Linksys BEFSR41 Router.

"What in the world is a 'Linksys BEFSR41 Router?' you wonder. "Do I really need it, and, if I do, what do people think of it?" Surf on over to

`http://arstechnica.com/reviews/3q00/linksys/befsr41-1.html`

to find your answers. Specifically, in a couple of paragraphs, explain in fairly technical terms what this kit can do for someone like you, whether or not it seems a sensible purchase, and what the fellows at Ars Technica think of it. Oh, one other thing. Is this "Linksys BEFSR41 Router" the only way to go? What (possibly newer) alternatives have you? (A bit of searching on some other product-review or e-commerce sites might prove helpful with these latter queries. We leave their discovery to you.)

### There's No Place Like HomeRF. (15 points.)

7. With our lectures on the Internet now under your belt, it's time to apply your recently acquired knowledge of LANs and WLANs to your (dream) home.

Suppose that you have, minimally, two desktops and a laptop that you want to network together within the confines of your home. Moreover, you want both of those computers to share your cable or DSL modem's uplink to the Internet as well as your personal laser printer. And you don't want to be tied down with that laptop—you want it to connect wirelessly to this little network of yours.

Exactly how could you go about implementing this general design? In the form of a diagram, supplemented by a few paragraphs of descriptive text, spell out directions for building such a

network. Specifically, explain exactly what hardware this venture requires, what type of cabling you need, how you should go about connecting everything together, and so forth. Be sure to label each of your diagram's network interfaces with a unique MAC (*i.e.*, Ethernet) address and an appropriate, unique IP address. (By "appropriate," we mean that your choices of IP addresses should make sense.) Also note the bandwidths of your various components as well as the technologies (802.11b, 802.11b/g, 802.11g, *etc.*) underlying your design.

The more technical your discussion, the more impressed we will be! In short, your diagram and text should provide a newbie (remember when you were one?) with sufficient direction for buying hardware for and setting up a home network.

Finally, in one, additional paragraph, justify your decisions. *Why* did you choose this and that technology? Was it because of speed? Cost? Simplicity? Couldn't recall your other options?

### E-1 Goes Shopping! (30 points.)

8. Guess what.

Now that you know all about hardware and software, we are giving you two thousand virtual dollars to spend at a local computer store!

Well, actually, your job for this problem is to "spend" up to \$2,000 in "virtual" dollars to "purchase" some hardware and software from a local computer store. We trust that this experience will bring you newfound confidence, if not excitement, in fairly technical atmospheres. (Read: we bet you know more than your salesperson.)

However, some guidelines are in order!

By trip's end, your "shopping cart" must "contain" the following items.

- i. One (1) desktop computer, complete with OS, monitor, keyboard, mouse, optical drive (of some sort), and NIC.
- ii. One (1) laptop computer, complete with OS, optical drive (of some sort), and NIC.
- iii. One (1) printer and printer cable.
- iv. All requisite hardware for networking these two computers and sharing an Internet connection (be it dialup, broadband, or DSL).
- v. One (1) game (that's supported by your desktop computer's graphics card).

In short, you need to buy yourself everything necessary for a two-computer LAN!

Note that you *must* visit a computer store for this problem. You may *not* do your "shopping" on the Web or through a catalogue. Stores that sell computer hardware and software include BestBuy, Circuit City, CompUSA, Micro Center, OfficeDepot, OfficeMax, and Staples. The locations of these stores can be found in your local yellow pages. However, you need not

restrict your “shopping” to these stores; you may visit any store that sells computer hardware and software.

Take advantage of your chosen store’s sales staff. Ask the staff any and all questions. Treat this problem as an opportunity to practice shopping for that new computer whose purchase you’ve been postponing and postponing and postponing.

However, we suggest that you not inform the sales staff that your funds are virtual. :-)

You may *not* “spend” more than \$2,000 in “virtual” dollars. (But you *may* pretend that you’re exempt from taxes for this question.) “Spending” even a penny more than \$2,000 will result in point deductions for this question. In restricting you to “shop” on a budget for these two computers, we hope that you learn how to balance computing needs with financial means. This budget should compel you think carefully about your “purchase” decisions. (For instance, “Do I really need 512 MB of RAM? Because if I only get 256 MB of RAM, I can save some money and buy a bigger display.”)

To be clear, this question does *not* require that you buy anything. It simply requires that you pretend that you have \$2,000 with which to “purchase” the prescribed items. You are expected to go to a computer store to *find out* exactly what you *could buy* with \$2,000, thereafter reporting your findings to us.

At the end of this problem set, you will find a “shopping list” and an “invoice.” Tear those pages out of this packet, complete the blank fields on each, and submit the completed pages as your answer to this problem.

### **Explaining Your “Purchases.” (5 points.)**

9. In two or more paragraphs, tell us what sort of decisions you had to make while “shopping.” What was your thought process? Did you find yourself strapped by the \$2,000 budget, or were those funds more than enough for your purchases? Did you have to make any compromises? That is, did you have to forego “buying” one item in order to “afford” another? Was your chosen store’s sales staff helpful? Did they teach you anything or did you feel that you knew more than they did?

In short, explain your “purchases.” Justify the dollars that you “spent,” using the rhetorical questions above as possible points of departure for your explanation.

**Failsafe. (100 points.)**

10. “Am I going to remember to submit this problem set via email to my teaching fellow?” you ask yourself rhetorically.

**Extra Credit. (5 points.)**

11. “Cyberspace” refers to the digital world constructed by the Internet. In this world, people communicate not with spoken words or body language, but through emails, bulletin boards, and chat rooms. It can be said that, in the film *You’ve Got Mail*, Tom Hanks and Meg Ryan fell in love in cyberspace as a result of their digital communications. Who coined this word “cyberspace”? Where? When?



## “Shopping” List

Be sure to fill in each of the blanks below in order to maximize your score for this problem.

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your name

Store Questions	Your Answers
Name of store:	
Location of store:	
Phone number of store:	
Name of salesperson who helped you (if any):	

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Desktop Questions	Your Answers
Brand of desktop computer:	
Operating system:	
Speed of CPU (in Hz):	
Type of CPU (Pentium 4, PowerPC G4, <i>etc.</i> ):	
Capacity of HDD:	
Speed of HDD (in RPM):	
Type of optical drive:	
Speed of optical drive:	
Amount of RAM:	
Type of RAM (SDRAM, RDRAM, <i>etc.</i> ):	
Amount of L2 cache:	
Type of sound card (built-in, SoundBlaster, <i>etc.</i> ):	
Type of graphics card (built-in, GeForce4, <i>etc.</i> ):	
Amount of video RAM:	
Make and model of display:	
Size of display:	
Other features:	



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Laptop Questions	Your Answers
Brand of laptop computer:	
Operating system:	
Speed of CPU (in Hz):	
Type of CPU (Pentium 4, PowerPC G4, <i>etc.</i> ):	
Capacity of HDD:	
Type of optical drive:	
Speed of optical drive:	
Amount of RAM:	
Size of display:	
Other features:	

Printer Questions	Your Answers
Make and model of printer:	
Speed of printer (in ppm):	

LAN Questions	Your Answers
Cables:	
Other LAN equipment:	

Game Questions	Your Answers
Name of game:	
Type of game:	

