General Comments

The first midterm exam is scheduled for Wednesday, 7 October, in class. The exam will cover material through 2 October, including lecture material, labs, and chapters 1 through 3.4 in the textbook. Here is a list of some of the most important topics (although I may have missed a few):

- Chap. 1: Basic definitions and concepts (client/server, circuit vs. packet switching, FDM, TDM, delay, loss, throughput, traffic intensity, protocols, messages, segments, datagrams, frames, etc.). Be able to do simple calculations related to delay, throughput, etc. Understand and be able to demonstrate the advantages of packet-switching. Be sure to read the whole chapter, not just the parts referenced above!

- Chap. 2: Basic definitions and concepts (sockets, ports, RTT, proxy servers, HTTP, FTP, DNS, POP3, IMAP, etc.). Understanding of the basics of the HTTP, SMTP, DNS, and FTP applications (e.g., main commands and options — ”GET”, ”conditional GET”, ”RCPT TO:”, etc.; the formats of things like DNS records, differences between recursive and iterative, different kinds and levels of DNS servers, etc.). Basics notions of socket programming in Java (we’ll have to agree on what sorts of questions are ”fair game” here.)

- Chap. 3: Basic definitions and concepts (multiplexing, demultiplexing, TCP, UDP, ports, process vs. host, checksums, etc.). Principles of reliable data transfer. Be able to draw timing diagrams showing data and ACK/NAK segments, know how to read finite-state diagrams for protocols, understand working of GBN and SR.

The exam is closed book, closed notes. No calculators, iPods, cell phones, or other devices are allowed.

Practice Problems

This is not a sample exam! These are just practice problems for you to use to brush up on the material.

1. Explain the major causes of delay in sending a large amount of data from a source to a destination through one or more intermediate switches.

2. A Web site with a small amount of text and ten small embedded images is fetched via the HTTP/1.0 protocol. How much time, measured in RTTs, is needed to fetch the site?

3. Same question, but using HTTP/1.1 with persistence.
4. Where is the following Java code more likely to occur, in a client application or a server application? Why?

```java
...
mySocket.receive(receivePacket);
String message = new String(receivePacket.getData());
InetAddress ipAddress = receivePacket.getAddress();
int port = receivePacket.getPort();
...
```

5. See figure 3.26 in the textbook.
   Redraw the diagram (you don’t need to include the pictures of the windows) assuming that ACK0 is lost on its way from the receiver back to the sender. (This is in addition to the lost pkt2.) Assume that the timer for pkt0 times out at the point where ACK0 would have been received in the original diagram.

6. What does “multiplexing” mean in the context of hosts versus processes?

7. “Please do not touch Steve’s pet alligator.” What is the significance of this quotation in the context of a course in networks? [Just kidding!]

8. A 100-byte packet is sent from A to B over a 200-kilometer link. The propagation speed over this link is about 2/3 the speed of light, i.e., $2 \times 10^8$ meters per second. Point A can transmit at a rate of 4Kbps. How many seconds elapse from the time transmission begins at A until the last bit is received at B?

9. We know that it is possible for the same host name to refer to different services. For example, “allegheny.edu” can refer to the Allegheny Web site as well as to the Allegheny mail server. What type of DNS query enables us to find the “true” name of the mail server?

10. What is a “TLD” server? (Hint: related to DNS)

11. What are the components of total delay in a packet-switched network? Explain each one in a few words (in other words, don’t just say something like “processing delay,” but explain what processing takes place).

12. Define “traffic intensity.” What is its significance?

13. How can a user make an email appear as though it comes from someone else (e.g., “From: potus@whitehouse.gov”?

14. List the well-known ports and their corresponding applications for at least two of the applications we’ve studied.

15. ...more in lab? ...