

**Homework #1, Due Tuesday Sept. 25**  
**CS A342, 47 points total**

**Network Game**

- 1) (4 pts) Based on your experience with the network game, identify at least two sources of error or corruption in sending a message. How might these errors be detected and remedied?
- 2) (4 pts) Describe a modification to the ACK/NAK protocol used in the network game that would be more efficient in a mostly error-free environment. How does your modification perform in a noisy environment with many errors?

**Diagnostic Tools**

Here is some old but still accurate background material on ping (which use the ICMP protocol).

[http://www.idgnet.com/crd\\_traceroute\\_123957.html](http://www.idgnet.com/crd_traceroute_123957.html)

and some old but still accurate background material on traceroute.

<http://www.math.uaa.alaska.edu/~afkjm/cs342/traceroutetutorial.html> and/or

- 3) (2 pts) Try pinging lidingo.se.eu.undernet.org. What is the average round trip time?
- 4) (2 pts) Try pinging www.ebay.com. Can you access it with a web browser? Can you explain what happened when you tried to ping it?
- 5) (4 pts) The times reported by traceroute and ping report primarily on the latency between routers as opposed to the bandwidth. The latency of a connection refers to the time it takes for a message to propagate from the sender to receiver. The bandwidth refers to the amount of data we can send at one time. An analogy is a freeway bridge; the latency is the time it takes to drive across, while the bandwidth is the number of lanes we have available for mass traffic. Ideally you would like low latency and high bandwidth.
  - a. Describe an application where it would be ok to have high latency if there was high bandwidth.
  - b. Describe an application where it would be ok to have low bandwidth if there was low latency.
- 6) (4 pts) Assume there are three routers (R1, R2, and R3) between the source and destination and that the middle router (R2) decrements the TTL but incorrectly forwards the IP datagram when the incoming TTL was 1. Describe what happens when you are running traceroute from the source to the destination. (This is an actual problem that was discovered as traceroute was developed, and is from comments in the source code).

## Theory Problems

- 7) (4 pts) Chapter 2, Problem 21. Suppose that your department has a local DNS server for all computers in the department. You are an ordinary user (i.e. not a network/system administrator). Can you determine if an external Web site was likely accessed from a computer in your department a couple of seconds ago? Explain.
- 8) (4 pts) Chapter 2, Problem 22. Consider distributing a file of  $F = 15$  Gbits to  $N$  peers. The server has an upload rate of  $u_s = 30$  Mbps and each peer has a download rate of  $d_i = 2$  Mbps and an upload rate of  $u$ . For  $N = 10, 100,$  and  $1000$  and  $u = 300$  Kbps,  $700$  Kbps, and  $2$  Mbps, complete the table below giving the minimum distribution time for each of the combinations of  $N$  and  $u$  for both client-server and P2P.

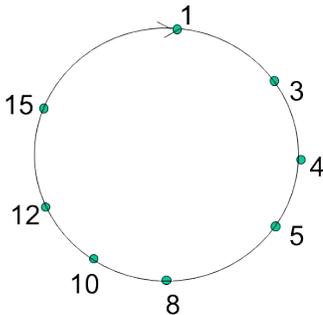
Client Server

	N=10	N=100	N=1000
u = 300 Kbps			
u = 700 Kbps			
u = 2 Mbps			

P2P

	N=10	N=100	N=1000
u = 300 Kbps			
u = 700 Kbps			
u = 2 Mbps			

- 9) (3 pts) In the Circular DHT below what are the steps taken when peer 1 wants to know what value is associated with the key 9?



## Socket Programming

[www.cse.uaa.alaska.edu](http://www.cse.uaa.alaska.edu)

- 10) (6 pts) A UDP Server is listening on port 9876 at ~~IP Address 137.229.156.166~~. Write a UDP client that connects to this server, sends the message "HELLO" in a datagram packet, then receives data from the server. The data will be a string of text. Output the text. What message does the server send back?
- 11) (10 pts) Write a threaded web server listening on port 8000 that is capable of:
- Determining what HTML file is requested (OK to only be a file in the web server's directory). If no HTML file is requested then the default should be "index.html".
  - Get the requested file (you will have to make some dummy HTML files)
  - Create an HTTP response message consisting of the requested file preceded by the appropriate header lines and send it to the client

You don't have to handle image or other file types, but if you do so you can get some extra credit. For the 10 points you only need to be able to read and send back HTML files.

You should be able to access your web server using your web browser by navigating to <http://localhost:8000>