CS550 Written Assignment 1 (WA#1)

Submission:

- ***Due by 11:59pm of 02/06/2017 (Monday).***
- ***Late penalty: 20% penalty for each day late.***
- ***This is an individual assignment.***
- ***Please upload your assignment on the Blackboard with the following name: Section_ LastName_FirstName_WA1.***
- ***Please do NOT email your assignment to the instructor and TA!***

Chapter 1

1. Q: Sketch a design for a home system consisting of a separate media server that will allow for the attachment of a wireless client. The latter is connected to (analog) audio/video equipment and transforms the digital media streams to analog output. The server runs on a separate machine, possibly connected to the Internet, but has no keyboard and/or monitor connected.
2. Q: Describe precisely what is meant by a scalable system.
3. Q: Scalability can be achieved by applying different techniques. What are these techniques?

Chapter 2

4. Q: If a client and a server are placed far apart, we may see network latency dominating overall performance. How can we tackle this problem?
5. Q: Consider a chain of processes P1,P2,…,Pn implementing a multitiered client-server architecture. Process Pi is client of process P(i+1), and Pi will return a replay to P(i-1) only after receiving a reply from Pi+1. What are the main problems with this organization when taking a look at the request-reply performance at process P1?
6. Q: Consider a BitTorrent system in which each node has an outgoing link with a bandwidth capacity *Bout* and an incoming link with bandwidth capacity *Bin*. Some of these nodes (called seeds) voluntarily offer files to be downloaded by others. What is the maximum download capacity of a BitTorrent client if we assume that it can contact at most one seed at a time?

Chapter 4

7. Q: In many layered protocols, each layer has its own header. Surely it would be more efficient to have a single header at the front of each message with all the control in it than all these separate headers. Why is this not done?
8. Q: Consider a procedure *incr* with two integer parameters. The procedure adds one to each parameter. Now suppose that it is called with the same variable twice, for example, as *incr*(*i*, *i*). If *i* is initially 0, what value will it have afterward if call-by-reference is used? How about if copy/restore is used?
9. Q: Describe how connectionless communication between a client and a server proceeds when using sockets.
10. Q: What trade-off should be made when we decide between a shared memory model and a message passing model? Why does this make shared memory a bad match for a system distributed across the Internet?