

CS550 Written Assignment 1 (WA#1)

Submission:

- *Due by 11:59pm of 09/16/2018 (Sunday).*
 - *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!*
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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:** What is the difference between a multiprocessor and a multicomputer?

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 P_1, P_2, \dots, P_n implementing a multitiered client-server architecture. Process P_i is client of process P_{i+1} , and P_i will return a replay to P_{i-1} only after receiving a reply from P_{i+1} . What are the main problems with this organization when taking a look at the request-reply performance at process P_1 ?
6. **Q:** Consider a BitTorrent system in which each node has an outgoing link with a bandwidth capacity B_{out} and an incoming link with bandwidth capacity B_{in} . 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:** One way to handle parameter conversion in RPC systems is to have each machine send parameters in its native representation, with the other one doing the translation, if need be. The native system could be indicated by a code in the first byte. However, since locating the first byte in the first word is precisely the problem, can this actually work?
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?