CSC490 Technical Questionnaire [SAMPLE]

The purpose of this questionnaire is to assess your technical knowledge about various concepts fundamental to computer science. You must be in your graduating year in CS to participate. Your information will remain completely confidential and anonymous. Please do not refer to any outside sources (internet, textbooks, etc) when doing the questions – we're looking for honest answers so that we have honest results. You have one hour to do this questionnaire. If you can't figure out the answer for a question, it's ok – you can skip it and move on.

1. Did you participate in the PEY program? Y/N
2. If yes, what was your main role? Java developer? Database admin? QA Tester? Can you tell me the most interesting project you've worked on?
3. If no, what was the most interesting project you've participated in, either during class or outside?
4. What language are you most familiar with?
5. [Systems] Rank these operations from fastest to slowest: Disk Seek, Context Switch, CPU access, Main memory access.
6. [General] Convert 2F from hexadecimal to binary.
7. [General] What is the biggest possible value for an unsigned integer?
8. [Linux] How do you display the processes that are taking up the most CPU memory on a Linux machine?
9. [Data Structures] When would you use a binary search tree over a hash table and why?
10. [Complexity] What is the best and worst case runtime of Quicksort?
11. [Threads] What conditions are necessary for a deadlock to occur? How would you prevent deadlock?
12. [Network] What is a network / subnet mask? Explain how host A sends a packet to host B when both are on different networks.
13. [Low level] Explain the following terms: virtual memory, page fault, and thrashing.
14. [Database] What's the difference between an inner join and an outer join on two tables in a database?
15. [Java] In Java, what's the difference between final, finally and finalize?
16. [Bit manipulation] Explain what the following code does: ((n & (n-1)) == 0).
17. [Object Oriented] How would you design a chess game, using object oriented principles? What classes, subclasses, methods, objects, and variables would be used? Any design patterns? Just explain, no code necessary.

Choose one of:

18. [Arrays] Given an array of integers, all of which appear an even number of times, explain how would you find the integer which appears an odd number of times? Explain any data structures, running times, etc.
19. [Algorithms] If you have a 2GB file with one string per line, which algorithm would you use to sort the file and why? Assume you have X MB of memory available.

20. [System Design] You have a billion URLs, each of which is a huge page. How do you detect the duplicate documents?

Choose one of:

21. [Linked Lists] You are given a linked list which contains a cycle (somewhere in the linked list, a node loops back to an earlier node). Using pseudo code, design an algorithm which can detect the cycle, and give the running time.
22. [Trees] Given a binary search tree, design an algorithm using pseudo code to find the first common ancestor of two nodes in the tree, and give the running time.
23. [Recursion] Write a method using pseudo code, to compute all permutations of a string, and give the running time. (ie. Permutations of string “abc” would be {“abc”,”bac”,”bca”,”acb”,”cab”,”cba”}).

Thank you for your participation!