

CSE596 Final Exam

This take-home exam is to be complete and electronically submitted to Adam (carlson@cs.washington.edu) on or before 9:00 AM, Monday 16 December 2002.

Ground Rules: Take-home exams are conducted on the honor system. Pick a 4 hour block of time to take the test. (The actual effort required to answer the questions is under 2 hours.) Answer all questions within that time period. Do not return to it. You may use any materials and documents you wish (materials from class suffice), but please do not consult other people.

Points are shown in brackets. In all questions, show your work and explain your reasoning. Good luck!

1. [20] **ZPL Programming Exercise.** Write a ZPL code segment, including all declarations, that projects a 3D cube as follows: Assume an $n \times n \times n$ array A (already filled with data), and compute the three 2D arrays, B_{nn} , B_{n_n} and $B_{nn_}$, found by summing A along each dimension.
2. [20] **Network Routing Exercises.**
 - (a) A packet is sent on a hypercube network from node [0000 0000] to node [1010 0101]. Give two different paths that the packet might take in a minimal adaptive network by listing the processors visited.
 - (b) A packet is sent on an 8x8 torus from node [0,0] to node [5,6] using Chaos router. Measuring from the time the first phit enters from the NIC to the time the last phit exits to the NIC, how many ticks are required for the transmission if in one node the packet fully enters the multiQ (but does not wait further in the MQ) and in all other nodes the packet encounters only the minimum delay?
3. [20] **Ultracomputer Exercise.** It has been proposed that a revised Ultracomputer design can “save” the idea of shared-memory-through-combining by changing the network and memories so that there is just one location (double word) at each memory port. Each processor is also given a large private memory. Write a paragraph explaining what problems this solves and what problems it creates. Will it work?
4. [40] **Model Exercise.** The concept of a “parallel machine model” has played an important role in this class. Explain in your own words – as if to another PMP student who hasn’t taken CSE596 – what the concept is, what is important about the idea, how it has been used, and its relationship to a “performance model.” (Your explanation can be no longer than a page, and is best if it is well organized.)