

CS 574

Final Exam

December 10, 2001

The following exam is open book and open notes. You may feel free to use whatever additional reference material you wish, but **no calculators** are allowed. Please note the following instructions. There will be a ten point deduction for failure to comply with them:

- start each problem on a new sheet of paper
- write your social security number, but not your name, on each sheet of paper you turn in
- show your work whenever appropriate. There can be no extra credit unless I see how answers were arrived
- be succinct. I will take points for facts that, while true, are not relevant to the question at hand

You have until 10:00 to finish the exam. The questions are equally weighted.

1. Suppose you have a cluster of four computers, using distributed shared memory. Initially variable A is on Processor A, B is on 2, C is on 3, and D is on 4; these assignments are also the variables' home processors. Give a possible sequence of messages which will maintain strict consistency if the processors perform the following sequence of C operations (yes, the intent is that event of the question is that event 1 is completely performed before event 2 starts, and so on):

Event	Processor	Operation
1	1	<code>b = 1;</code>
2	4	<code>a = b + 2;</code>
3	3	<code>a = a + b;</code>
4	1	<code>d = a;</code>

2. Process migration proved to be quite a difficult problem in conventional, Unix-like operating systems. Would you expect creation of mechanisms similar to processor migration in an operating system similar to Clouds to be easier or harder than for Unix?

3. Disk caches are areas of memory used to store requested disk writes until they can actually be written to the disk, and to keep copies of data read from disk before it is delivered to a process. They improve performance both by reducing the actual number of reads and writes, and by allowing disk accesses to be sorted.

In a cluster computing environment, we may have programs on client computers making use of disk drives on servers. Would it be preferable to keep the disk caches on the server machines, or on the client machines?

4. Would adding a timestamp to packets in the TCP protocol be helpful in maintaining a consistent global time across a network?
5. I walk into the Corbett Center carrying a wireless-networking-enabled PDA, and a server wishes to download the day's schedule. Outline a mechanism by which my PDA can verify that the server is in fact Corbett Center's server, and not a laptop sitting on a table inhabited by a malicious user. You'll want to use encryption here, somehow. I expect you'll also need to make some assumptions about information already present on the PDA.