

CS 574
Final Exam
December 13, 2002

The following exam is open book and open notes. You may feel free to use whatever additional reference material you wish, but **no electronic aids** 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 partial credit unless I see how answers were arrived
- be succinct. You may lose points for facts that, while true, are not relevant to the question at hand

You have until 12:30 to finish the exam. The questions are equally weighted.

1. Motivations and Microkernels
2. Would it be possible to build a CORBA server on top of RPC? Would it be possible to build it on top of MPI? If both are possible, which would be more reasonable?

3. Consider the following memory reads and writes:

P1	W(x)1	W(y)1			
P2	W(x)2	W(y)2			
P3		R(x)1	R(y)2	R(x)2	R(y)1
P4		R(x)2	R(y)1	R(x)1	R(y)2

- (a) Name a memory consistency model for which this diagram *is not* valid. Why does it violate the model you picked?
 - (b) Name a memory consistency model for which this *is* valid.
 - (c) Draw a picture showing a network topology which could, in combination with the consistency model you picked in 3b, result in the given diagram.
4. One of the differences between ReiserFS and a conventional Unix-like file system such as ExtFS is that ReiserFS lets several “tails” (the incomplete last block of a file) be combined in a single block. Would it be possible to modify Ext2FS to do this, as well? If not, why not? If so, briefly outline an approach.
 5. If you write code assuming Mesa monitor notify/wait semantics but your system uses Hoare signal/wait semantics, it will still work; if you assume Hoare semantics but the system uses Mesa semantics it won't. Why?
 6. Suppose NMSU had a mobile computing infrastructure, in which all of campus is covered by overlapping wireless zones. Any given user has at least one zone on campus whose server is trusted, but does not typically “know” all of the zones on campus. Suggest a way that a user, walking across campus and entering a new zone, can determine that the new zone is a legitimate part of the NMSU infrastructure and not a “pirate” running a wireless access point distributing incorrect information. In answering this question, you can assume (1) arbitrary encryption is available, and (2) the legitimate NMSU wireless access points can cooperate in assisting the user in authenticating a new zone.