

Take-Home Exam for CS547---Spring 2007
(Given on 11/27/07, Due on 12/4/27 at 3PM)

Consider a community C consisting of: (1) a group P of application agents; and (2) a group K of kernel agents, which are to be used as lower level tools by the application agents. These agents interact subject to a law L, informally specified below:

1. Agents in groups P and K self identify themselves as such in the parameters of the *adopt* message. (See, however the extra-credit assignment below).
2. Message exchange between agents in P and K is subject to the following rules:
 - a. Agents belonging to either P or K can exchange messages with agents in their own group.
 - b. P-agents (i.e., agent in P) can send messages to any K-agent (subject to point c below)—we call such messages “commands”—but a K-agent can only respond to such a command via a single message, and each response must satisfy the following requirements:
 - i. The response must identify the command they respond to.
 - ii. The response must be sent at a delay no larger than 1 second; if no such response is sent in time, then an automatic exception message must be sent to the commanding P-agent.
 - c. Any agent x in C can send a “prohibit” message to any agent y in C. Once y gets this message, it would not be able to send messages to x.

Your assignment: Design the law L itself, and construct a test community for it; also write a brief report explaining your law, and the testing you have performed, using your test community. Finally, submit the law, and a test community to Bill (your TA) in a runnable package, as well as a printout of your report, by 3PM on 12/4. Then schedule with Bill a meeting with him to demonstrate your work during the following week.

Extra-Credit assignment: you can get complete credit for this exam just by doing the above, but you can get extra credits by changing law L to L', which has the following provisions:

1. Instead of self identification of agent as to which group they belong, let them identify their group via certificates; this requires, of course to build a simple CA that would issue the necessary certificates---you do not have to worry about revocation.
2. Let community C include a distinguished agent s, called the secretary—in addition to groups P and K described above. And have your law L' provide for the following:
 - a. Every newborn agent starts its life by reporting to s its address and its group (P or K).
 - b. Every agent in C can query s for the membership in both P and K. (Note: the communication with s must be provided for by law L', but the maintenance of the membership database should be done by the secretary s itself.)

