CS 7270 Networked Applications and Services **Spring Semester, 2002**

Homework 4

Assigned: April 17, 2002 *Due: April 26, noon*

1. Explain how the forwarding pointers work in the Grid location service. Give an example to illustrate their operation. Show an example in which they fail to solve the problem of locating a node.

2. Write a program that takes as input the size of a Grid world, a value n for the number of levels of grid hierarchy, and a set of (x,y) locations for grid nodes, along with the IDs of the nodes in these locations. The program should compute the content of each location server according to the scheme described in the Grid/GLS paper. (In other words, you are automating the computation of the values shown in Figure 4, for example.) Provide the ability to compute the location servers that are "visited" in satisfying a location query. This will allow you to determine the length of the location query paths (i.e., how many location servers are visited in satisfying a query). We will provide the parameters for you to use in demonstrating the operation of your code.

3. Propose a solution to the problem that can occur when a sensor network using directed diffusion contains a lossy link (described in the paper at the end of Section 3.4). Your solution should be different from the one mentioned in the paper. Illustrate the operation of your solution on a small example and state the pros and cons.

4. Give an example showing that the dispersion between two packets can **decrease** after traversing the narrow link in a path. Be specific by stating the link speeds on the path, showing the packet pair spacing at different points in time, and showing the queue occupancy encountered by the packet pair.