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Baltimore, Nov. 12 2003

Theory of Network Communication

Fall 2003

Assignment 9

Problem 19 (5 points)**:**
In the last week we presented a balanced, supervised tree network. Suggest mechanisms for JOIN and LEAVE that would allow you to construct a balanced, *unsupervised* tree network (i.e. a dynamic tree of depth $O(\log n)$). The tree network should be organized that it is a search tree (i.e. one can search for a peer in the tree in $O(\log n)$ steps).

Hints: You may want to use your knowledge about balanced search trees, or you may think about your own balancing rule.

Problem 20 (5 points)**:**
Write a C++ program in the *new* Spheres environment that has an implementation of JOIN and LEAVE for an unsupervised doubly linked cycle in which the peers are ordered according to their names (which may simply be integers). Test your system by starting with a single peer, increasing the system one by one to 10 peers, and then shrinking it down one by one to 5 peers.

Hints: Make sure that every peer registers once it is in the system and that peers only join by using the Any() command (i.e. no peer should know any other peer in advance). Since a new peer can get in contact with an arbitrary peer already in the system, make sure that your JOIN implementation has a routing function to move the request to the right location. It suffices to use implementations for JOIN and LEAVE for the isolated case. (But try to think about how one could also solve the concurrent case in an unsupervised environment; we will discuss that in class.)