

Advanced Distributed Algorithms and Data Structures

SS 2019

Homework Assignment 3

Problem 1:

Implement the synchronizer α (see the code on slide 45 of the newest version of Chapter 2) in the NetSimLan environment and run it on some (arbitrarily generated) graph.

In order to test it, assume that the synchronous algorithm to be simulated works as follows: In every round, each node picks any of its neighbors and sends a ping request to it. Upon receiving a ping request, a node replies with a pong request. Upon receiving a pong request, a node may simply print out "pong received" (or doesn't do anything).

Problem 2:

Implement a parallel BFS algorithm in the NetSimLan environment and run it on some (arbitrarily generated) graph by initiating it from some selected node v in NetSimLan in order to set up a shortest path tree from v (i.e., a spanning tree with root v that contains a shortest path from any node to v). For an example of such a tree, see the example on slide 12 of Chapter 4.

Problem 3:

Implement the synchronizer β (see the code on slide 49 of the newest version of Chapter 2) in the NetSimLan environment and run it on some (arbitrarily generated) graph. In order to set up a tree T for the synchronizer β , use the tree that results from the parallel BFS algorithm in Problem 2. After T has been set up, the root starts the synchronizer β by broadcasting some "go" message to all nodes via T .

Again, in order to test the algorithm, assume that the synchronous algorithm to be simulated works as follows: In every round, each node picks any of its neighbors and sends a ping request to it. Upon receiving a ping request, a node replies with a pong request. Upon receiving a pong request, a node may simply print out "pong received" (or doesn't do anything).

Problem 4:

Prove Observation 4.4 on slide 49 of Chapter 4.