Parallel Processing

Fall 2008

May 7, 2008

NOTE: this exam is closed book and closed notes.

Problem 1 [30 Points]

Discuss the problem of determining termination of computation in a distributed setting.

Provide a detailed discussion of the black-white token scheme and the fixed energy scheme; compare the two in terms of number of messages generated and other critical performance parameters.

Problem 2 [50 Points]

Consider the problem of solving a *discrete optimization problem*. The problem is described by a collection of variables $x_1, \ldots, x_n$, and each variable can be assigned only the values 0 and 1. The optimization problem is described by a collection of constraints of the form $a_1x_1 + \ldots + a_nx_n \leq c$, and the problem has an objective function $c_1x_1 + \ldots + c_nx_n$, that has to be minimized.

1. Describe (using pseudocode) an *iterative deepening* algorithm to solve the problem
2. Describe parallelization of this method using an OpenMP-style approach. Discuss what components will affect the parallel performance.
3. Describe parallelization of this method using an MPI-style approach. Discuss what components will affect the parallel performance.

Problem 3 [20 Points]

Consider a generic Linda-style blackboard library. Discuss the main issue of implementing it on a distributed memory platform.