

Parallel Algorithm Design and Analysis

Instructor: Stephen Providence

Term: Spring 2005

Time: Tuesday and Thursday, 2:00 – 3:15

The most important element of parallel computation and the primary focus of this course is the parallel algorithm, without which no problem could be solved in parallel. Just as algorithms occupy a central place in computer science, parallel algorithms occupy the center in parallel computation. Given a problem to be solved in parallel, a parallel algorithm defines how the problem can be solved on the given parallel computer. Specifically, parallel computation must specify how the problem is divided into sub-problems, how the processors communicate, and how the partial solutions are combined to produce the final answer. An understanding of the role of parallel algorithms and a good knowledge of the techniques of designing and analyzing these algorithms are essential to anyone entering the field of parallel computation. Additionally, theoretical models of parallel computation are studied. These models differ according to whether the processors communicate among themselves through a shared memory or an interconnection network, whether the interconnection is in the form of an array, a tree, or a hypercube, whether the processors execute the same or different algorithms and whether the processors operate synchronously or asynchronously.