ABSTRACT

Distributed Artificial Intelligence as a Unifying Approach to Concurrency and Parallelism

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Concurrent programming and parallel processing increase the utilization of resources and the efficiency of a computer system; however, control problems arise from having several resources and components operating simultaneously. Problems of concurrency and parallelism fall into two categories: those related to parallel processing in a centralized system, and those related to parallel distributed processing. Traditionally, problems of concurrency and parallelism have been resolved by means of the operating system; but with the coming of distributed systems, these problems have become much too complex to be handled by conventional operating systems.

In this thesis, an approach which uses distributed artificial intelligence is presented as a solution to these problems, in both centralized and distributed systems. Distributed artificial intelligence addresses problems of concurrency and parallelism in its approach to distributed problem solving. Principles of rationality for coordinating parallel processing agents in distributed problem solving are shown to be relevant to parallel processing, as well as to parallel distributed processing. Therefore, distributed artificial intelligence can be used effectively as a framework for parallel processing and parallel distributed processing.