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OASys: An AND/OR parallel logic programming system

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Abstract

The OASys (Or/And SYStem) is a software implementation designed for AND/OR-parallel execution of logic programs. In order to combine these two types of parallelism, OASys considers each alternative path as a totally independent computation (leading to OR-parallelism) which consists of a conjunction of determinate subgoals (leading to AND-parallelism). This computation model is motivated by the need for the elimination of communication between processing elements (PEs). OASys aims towards a distributed memory architecture in which the PEs performing the OR-parallel computation possess their own address space while other simple processing units are assigned with AND-parallel computation and share the same address space. OASys execution is based on distributed scheduling which allows either recomputation of paths or environment copying. We discuss in detail the OASys execution scheme and we demonstrate OASys effectiveness by presenting the results obtained by a prototype implementation, running on a network of workstations. The results show that speedup obtained by AND/OR-parallelism is greater than the speedups obtained by exploiting AND or OR-parallelism alone. In addition, comparative performance measurements show that copying has a minor advantage over recomputation. © 1999 Elsevier Science B.V. All rights reserved.