

**ALAIN DARTE, YVES ROBERT AND FREDERIC VIVIEN,
“SCHEDULING AND AUTOMATIC PARALLELIZATION”,
BIRKHAUSER BOSTON, 2000, ISBN 0-8176-4149-1**

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This book offers a detailed and self-contained presentation for studying loop transformations, the detection of parallel loops, and how to use them to detect parallelism in a specific program. It provides careful explanation and exposition for all parallel-loop algorithms that have been designed recently in a framework of scheduling algorithms on cyclic graphs, primarily task graph scheduling and loop nest scheduling perspectives.

Program restructuring techniques are important optimization methods used in parallelizing compilers. The focus is on loop transformations, because there is where a program spends most of its execution time. The authors, well known in the parallelizing compilers community, have original contributions regarding loop restructuring based on unimodular transformations and general affine transformations.

Scheduling and Automatic Parallelization offers an explanation of how to incorporate these transformations in algorithms, which transformations to apply, and how to optimize them. It provides a full study of loop transformations, and algorithms for parallel loop detection in a scheduling perspective, making the link with cyclic scheduling and systems of uniform recurrence equations.

One of the main contributions of the book is building a unifying theory of loop nest scheduling. This theory is developed based upon the previous work of Karp, Miller, Winograd and Lampart and it relies on sophisticated mathematical tools : unimodular transformations, parametric integer linear programming, Hermite decomposition, Smith decomposition etc.

The book is an essential reference for the latest developments in automatic parallelization methods used for scheduling, compilers, and program transformations. It is intended for graduate and postgraduate students interested in automatic parallelization techniques, researchers interested in scheduling, compilers and program transformations. Software engineering and computer engineering professionals will

find it a very good resource and reference. It is also suitable for self-study purposes by practitioners.

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