Murray Cole, Sergei Gorlatch, Christian Lengauer, David Skillicorn (editors):

Theory and Practice of Higher-Order Parallel Programming

Dagstuhl-Seminar-Report; 169
17.02.-21.02.97 (9708)
## Contents

1 Preface

2 Abstracts
   - Skeletal Programming – Present and Future
     Murray Cole ................................................................. 3
   - Combining Task and Data Parallelism within Skeleton-Based Models
     Susanna Pelagatti .......................................................... 3
   - The Higher-Order Parallel Programming (HOPP) Model
     Roopa Rangaswami ....................................................... 4
   - PAR Considered Harmful
     Luc Bougé ................................................................. 4
   - Development of Parallel Programs: Towards a Systematic Approach
     Sergei Gorlatch ............................................................ 5
   - Systematic Mapping of Higher-Order Functional Specifications
     Zully Grant-Duff .......................................................... 6
   - SPMD Programming in Java
     Susan Flynn Hummel ..................................................... 6
   - Abstract Parallel Machines: Organizing Higher Order Functions for Parallel Program Derivation
     John O'Donnell and Gudula Rünger ........................................ 7
   - Costs, Transformations, and Parallel Programming
     David Skillicorn ............................................................ 7
   - Deriving Programs with Mixed Method and Data Parallelism
     Gudula Rünger .............................................................. 8
   - Higher-Order Functions in Hardware Design
     Mary Sheeran .............................................................. 9
   - BSP Cost Analysis and the Implementation of Skeletons
     Jonathan M.D. Hill ........................................................ 10
   - A High-Level Programming Environment for Distributed Memory Architectures
     Wolfgang K. Giloi ........................................................ 10
   - Distributed Types: A Unifying Model of Spatial Structure in Parallel Programming
     Andreas Schramm .......................................................... 11
   - Deriving Parallel Algorithms using Data Distribution Algebras
     Thomas Nitsche ............................................................ 11
   - Exploiting Maximum Parallelism in Hierarchical Numerical Applications
     Alexander Pfaffinger .................................................... 12
A Data Flow Approach to Higher Order Functions for Recursive Numerical Applications
   Ralf Ebner ................................................. 12
The Elements, Structure, and Taxonomy of Divide-and-Conquer
   Z. George Mou ........................................... 13
Translation of Divide-and-Conquer Algorithms to Nested Parallel Loop Programs
   Christoph Herrmann and Christian Lengauer .................. 14
Algorithm + Strategy = Parallelism
   Phil Thrinder ........................................... 15
Runtime Interprocedural Data Placement Optimisation for Lazy Parallel Libraries
   Paul H J Kelly .......................................... 15
Functions Compute, Relations Co-ordinate
   Manuel M. T. Chakravarty ................................ 16
Practical PRAM Programming with Fork95
   Christoph W. Kessler .................................... 16
Costs and Semantics in Parallel Languages
   Gaétan Hains ........................................... 17
Vectors are Shaped Lists
   C. Barry Jay ............................................ 17
Alpha: A Functional Data Parallel Language Based on Polyhedra
   Sanjay Rajopadhye ...................................... 18
Structured Parallel Programming: Parallel Abstract Data Types
   Hing Wing To ........................................... 18
Yet Another Bridging Model – The Parallel Memory Hierarchy
   Larry Carter ............................................. 19
Data-parallel Skeletons
   Herbert Kuchen ......................................... 20
Skeleton-Based Implementation of Adaptive Multigrid Algorithms
   George Horatiu Botorog .................................. 21
Classification of Parallel Implementations for Linearly Recursive Functions
   Christoph Wedler and Christian Lengauer ................... 22
Types in Parallel Programming
   Eric Violard ............................................. 22
Formal Validation of Data-Parallel Programs: The Assertional Approach
   Luc Bougé and David Cachera ............................. 23
Data-Parallel Programming: Can we Have High-Level Languages *and* High-Performance?
   Jan F. Prins ............................................. 24