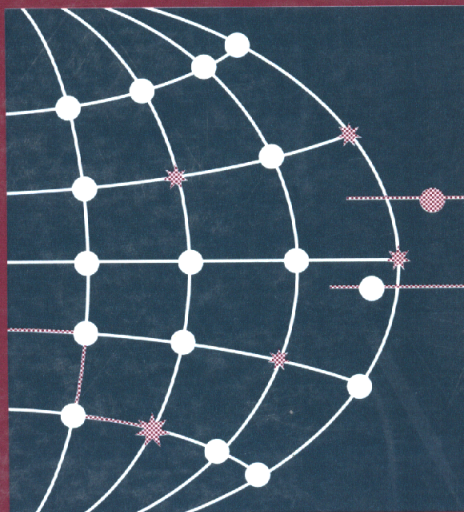
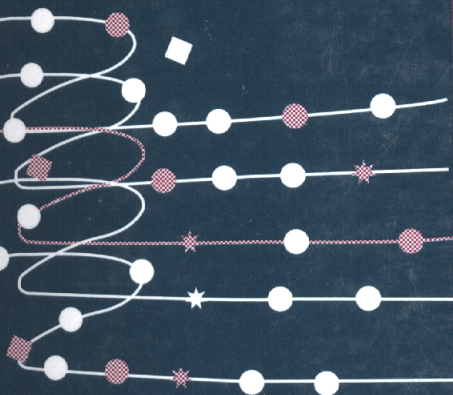


1997 3rd International Conference on
**Algorithms And Architectures
for Parallel Processing**

ICA³PP
97

BIBLIOTHÈQUE DU CERIST



Editors

**Andrzej Goscinski
Michael Hobbs
Wanlei Zhou**

1997 3rd International Conference on
**Algorithms And Architectures
for Parallel Processing**

1997 3rd International Conference on
**Algorithms And Architectures
for Parallel Processing**

ICAPP
97

*Melbourne, Australia
December 10–12 1997*

Editors

Andrzej Goscinski, Michael Hobbs, Wanlei Zhou
Deakin University Victoria, Australia

Sponsors

Deakin University
Faculty of Science and Technology, Deakin University
IEEE Victorian Section

 **World Scientific**
Singapore • New Jersey • London • Hong Kong

Preface

ICA³PP-97 brings together a well defined program of innovative research in the area of parallel processing, in particular parallel computer architectures, operating environments, parallel algorithms and parallel applications. Since its inception, the ICA³PP conference aims to provide a quality forum for scientists, researchers, engineers and practitioners to exchange their research ideas and results in parallel and distributed computing. Due to the interest of these specialists and very high quality of submitted manuscripts, ICA³PP has become a premier conference for parallel processing.

We received 136 full manuscripts and all of them were sent forward for review. Each paper was reviewed by at least three members of the International Program Committee or their nominees. The selection process was extremely vigorous and based on the reviewer's assessment (gradings and recommendations), a number of high quality papers have been rejected. Only 33 full length and 29 short papers have been accepted for publication in this volume and presentation at the conference.

We would like to thank all authors who have submitted their valuable works to this conference for consideration. We greatly appreciate the dedicated work of all reviewers and Committee members to uphold the high quality of the conference.

We were delighted to have the presence and contributions of Professor Jack Dongarra, Computer Science Department, University of Tennessee and Dr. Richard Wirt, Intel Fellow, Director of Software Technology Lab, California, as guest speakers.

The Organising Committee is grateful for the support and assistance received from its major sponsors: Deakin University, and the Faculty of Science and Technology of Deakin University and support from IEEE - Victorian Section.

I would like to thank the coordinators of the special sessions, Mohammed Atiquzzaman and Pradip Srimani for the session on "Computing on Clusters of Workstations", and Vincenzo Piuri for the session on "Parallel Algorithms and Architectures for Neural Processing". Their efforts in organising these special sessions and for preparing the guest editorials are greatly appreciated. Special thanks goes to Dr. Justin Zobel for providing us the software that made the reviewing process much simpler.

I also wish to thank all members of the Local Organizing Committee, Damien De Paoli, Robert Dew, Jutta Guenther, Michael Hobbs, Peter Horan, Jackie Silcock, Yun Yang and Wanlei Zhou, as well as the many other colleagues who have made this Conference possible.

Andrzej Goscinski
ICA³PP'97 Conference Chair

CONTENTS

Preface.....	v
---------------------	----------

PART I INTRODUCTION

Chapter 1	
Basic Issues of Algorithms and Architectures for Parallel Processing.....	1
 Chapter 2	
Parallel Processing Prospects	15
Network Enabled Solvers for Scientific Computing Using the NetSolve System	
<i>Henri Casanova and Jack Dongarra</i>	<i>17</i>

PART II ARCHITECTURES OF PARALLEL COMPUTER SYSTEM

Chapter 3	
Routing in Parallel Computer Systems	35
Adaptive Routing for a Bus-based Multiprocessor	
<i>Vincent J. Fazio</i>	<i>37</i>
Multi-node Broadcasting in Hypercubes and Star Graphs	
<i>Yu-Chee Tseng</i>	<i>51</i>
Calculating Optimal Flit Size and Upper Limit on the Performance of Wormhole Routing	
<i>Anthony Symons and V. Lakshmi Narasimhan</i>	<i>59</i>
Prioritized Physical Channel Scheduling in Wormhole Networks	
<i>Abdel-Halim Smai and Lars-Erik Thorelli</i>	<i>73</i>

Memory Ushering in a Scalable Computing Cluster <i>Amnon Barak and Avner Braverman</i>	211
Shadow Stacks - A Hardware-Supported DSM for Objects of any Granularity <i>Sascha Groh, Markus Pizka and Juergen Rudolph</i>	225
Update-based Distributed Shared Memory Integrated into RHODOS' Memory Management <i>Jackie Silcock and Andrzej Goscinski</i>	239
The Pilgrim: A New Consistency Protocol for Distributed Shared Memory <i>Herve Guyennet, Jean-Christophe Lapayre and Michel Tréhel</i>	253
Speculative Parallel Graph Reduction of Lambda Calculus to Deferred Substitution Form <i>Yong-Hack Lee and Suh-Hyun Cheon</i>	265
ATME: a Parallel Programming Environment for Applications with Conditional Task Attributes <i>Lin Huang and Michael Oudshoorn</i>	275

Chapter 6

Scheduling	283
Subtorii Allocation Strategies for Torus Connected Networks <i>Sandeep Gupta and Pradip Srimani</i>	287
A New Heuristic Algorithm Based on GAs for Multiprocessor Scheduling with Task Duplication <i>Tatsuhiro Tsuchiya, Tetsuya Osada and Tohru Kikuno</i>	295
Determination of an Optimal Processor Allocation in the Design of Massively Parallel Processor Arrays <i>Dirk Fimmel and Renate Merker</i>	309
Embedding a Complete Binary Tree into a Faulty Supercube <i>Huan-Chao Keh and Jen-Chih Lin</i>	323
Embedding of Congestion-free Complete Binary Trees with Dilation Two in Star Graphs <i>Yuh-Shyan Chen, Yu-Chee Tseng, Tong-Ying Juang and Chiou-Jyu Chang</i>	331
An Enhanced 2-D Buddy Strategy for Submesh Allocation in Mesh Networks <i>Tong-Ying Juang, Yu-Chee Tseng and Yuh-Shyan Chen</i>	345

A New Method for Transparent Fault Tolerance of Distributed Programs on a Network of Workstations using Alternative Schedules <i>Dibyendu Das, Pallab Dasgupta, P.P. Das</i>	479
---	-----

PART IV

PARALLEL ALGORITHMS AND APPLICATIONS

Chapter 9	
Parallel Algorithms	487
Parallel Algorithm and Architectures for Two-step Division-free Gaussian Elimination <i>Shietung Peng and Stanislav Sedukhin</i>	489
Generating Efficient Parallel Code for Successive Over-relaxation <i>Peiyi Tang</i>	503
A Parallel Rendering Approach to the Adaptive Supersampling Method <i>Sam Lin, Rynson Lau, Xiaola Lin and Paul Cheung</i>	511
A Fast Parallel Sorting Algorithm on the k-Dimensional Reconfigurable Mesh <i>Ju-Wook Jang and Kichul Kim</i>	519
Chapter 10	
Parallel Applications	533
Real-Time Obstacle Detection on a Massively Parallel Linear Architecture <i>Massimo Bertozzi, Alberto Broggi and Alessandra Fascioli</i>	535
On the Optimization of a Task-Farm Model for the Parallel Integration of a Two-Dimensional Schrödinger Equation <i>Ranieri Baraglia, R. Ferrini, D. Laforenza and A. Laganà</i>	543
Parallel Implementation of Synthetic Aperture Radar on High Performance Computing Platforms <i>Jinwoo Suh, Monte Ung, and Viktor K. Prasanna</i>	557
Parallelization of the H.261 Video Coding Algorithm on the IBM SP2® Multiprocessor System <i>N. H. C. Yung and K. K. Leung</i>	571

Fault Detection and Fault Tolerance in a Loosely Integrated Heterogeneous Database System <i>Wanlei Zhou</i>	717
A Parallel Sort-Balance Mutual Range-Join Algorithm on Hypercube Computers <i>Richard Wong, Rodney Topor and Hong Shen</i>	731
Distributed Parallel Generation of Indices for Very Large Text Databases <i>Joao Paulo Kitajima, M. D. Resende, B. Ribeiro-Neto and N. Ziviani</i>	745

APPENDICES

Program Committee	753
Local Organising Committee	755
Organisers and Major Sponsors	757
List of Technical Reviewers	759
Author Index	761
Subject Index	763